Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

Reserve
Ag854E

LIBRARY
CURRENT RECORD
★ AUG 8 1960 ★
U. S. DEPARTMENT OF AGRICULTURE

1960 **CATALOG** 1961

GRADUATE SCHOOL

U. S. DEPARTMENT OF AGRICULTURE

WASHINGTON, D. C.

GRADUATE
UNDERGRADUATE
AND
NON-ACADEMIC
COURSES

TRAINING FOR
FEDERAL EMPLOYEES

Calendar for 1960-61

FALL SEMESTER

Sept. 10–17	Registration (Late fee charged after Sept. 17)
Sept. 19–23	Classes begin
Sept. 30	Last day of registration for credit
	Last day of course transfer without late fee
Oct. 14	Deferred payments due
Oct. 28	Deadline for credit-audit change
Nov. 11	Veterans Day—no classes
Nov. 24	Thanksgiving Day—no classes
Dec. 19–Jan. 2	Christmas holidays—no classes
Jan. 3	Classes resume
Jan. 19	Close of fall semester *
Jan. 20	Inauguration Day—no classes

SPRING SEMESTER

Jan. 28–Feb. 4	Registration (Late fee charged after Feb. 4)
Feb. 6–10	Classes begin
Feb. 17	Last day of registration for credit
	Last day of course transfer without late fee
Feb. 22	George Washington's Birthday
Mar. 3	Deferred payments due
Mar. 17	Deadline for credit-audit change
May 26	Close of spring semester *

SUMMER SESSION

May 29–June 3	Registration (Late fee charged after June 3)
June 5–9	Classes begin
June 9	Last day of registration for credit
	Last day of course transfer without late fee
June 16	Deferred payments due
July 4	Independence Day—no classes
July 7	Deadline for credit-audit change
August 11	Close of summer session *

* Class meetings that are missed for any reason will be made up. Classes are not held on days when Government offices are closed early or all day due to hazardous weather conditions.

GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

CATALOG

FALL — SPRING — SUMMER

1960–1961

Please keep this catalog for use in the Spring and Summer

This Catalog, published annually by the Graduate School, contains the graduate and undergraduate programs for the Fall and Spring Semesters and the Summer Session. The right is reserved to make changes in the course offerings as circumstances require. Bulletins on correspondence study and the program at the National Institutes of Health are available upon request.

Contents

United States Department of Agriculture

EZRA TAFT BENSON, *Secretary of Agriculture*

Graduate School

General Administration Board

CLARENCE M. FERGUSON, B.S.A., Administrator, Federal Extension Service, Chairman
ERNEST C. BETTS, JR., Director of Personnel
C. O. HENDERSON, M.S., Chief, Employee Performance and Development, Office of Personnel
R. E. MCARDLE, Ph.D., Chief, Forest Service
TRUE D. MORSE, B.S.A., Under Secretary of Agriculture
MAX MYERS, Ph.D., Administrator, Foreign Agricultural Service
RALPH S. ROBERTS, LL.M., Administrative Assistant Secretary
BYRON T. SHAW, Ph.D., Administrator, Agricultural Research Service
C. N. SHEPARDSON, M.S., Governor, Federal Reserve Board
R. B. TOOTELL, M.S., Governor, Farm Credit Administration
ORIS V. WELLS, B.S., Administrator, Agricultural Marketing Service

Officers

JOHN B. HOLDEN, Ph.D., Director
EDMUND N. FULKER, M.S., Assistant Director
CONSTANCE G. COBLENZ, M.A., Registrar
RUTH O. CARLOCK, B.A., Administrative Officer
VERA E. JENSEN, Information and Library Services
TIMOTHY E. SMITH, M.A., Counseling Service
DWIGHT L. MYERS, Treasurer
FOSTER E. MOHRHARDT, M.A., Librarian

Graduate School Council

E. L. LECLERG ..... Department of Biological Sciences
E. J. PETERSON ..... Department of Correspondence
J. KENDALL MCCLARREN ..... Department of Languages and Literature
B. RALPH STAUBER ..... Department of Mathematics and Statistics
HENRY A. DONOVAN ..... Department of Office Techniques and Operations
HENRY STEVENS ..... Department of Physical Sciences
JOHN H. THURSTON ..... Department of Public Administration
BUSHROD W. ALLIN ..... Department of Social Sciences
J. P. SCHAENZER ..... Department of Technology
HENRY C. HERRELL ..... Department of Special Programs
JOHN B. HOLDEN ..... Chairman

COMMITTEE ON CORRESPONDENCE STUDY AND EXTENSION EDUCATION

E. J. Peterson (Chairman)

Louise O. Bercaw
Mary L. Collings
C. Edwin Davis
William A. DeVaughan
Cannon C. Hearne
Hans S. Hoiberg
James L. Robinson
James H. Starkey
Galen Yates
George A. Young

AGRICULTURAL RESEARCH CENTER COMMITTEE

N. R. Ellis (Chairman)

Esther L. Batchelder
C. H. Hoffmann
Charles A. Logan
Clifton Swift
J. F. Sykes
Martin G. Weiss

COMMITTEE ON PUBLICATIONS

James H. McCormick (Chairman)

Theodora E. Carlson
P. H. De Vries
Forest J. Hall
Robert T. Hall
Harry P. Mileham
Jerome H. Perlmutter
D. Harper Simms

COMMITTEE ON INTERNAL AUDIT

John C. Cooper (Chairman)

Carl A. Fretts
Howard E. Marshall
Robert T. McCleary
John W. Vaughan

COMMITTEE ON INFORMATION

Wayne V. Dexter (Chairman)

Layne R. Beaty
Philip Brown
David G. Hall
Lance Hooks
Dorothy M. Martin
Bryan M. Phifer
Elmo J. White

COMMITTEE ON SPECIAL PROGRAMS

Henry C. Herrell (Chairman)

Mildred Benton
J. Kenneth Mulligan
Kenneth W. Olson
H. A. Rodenhiser
Henry A. Sawchuk
Walt R. Simmons
Harry C. Trelogan
John L. Wells
Joseph E. Winslow
William T. Wolfrey
Mark W. Woods

General Information

Purpose of the School

Since its establishment in 1921, the objective of the Department of Agriculture Graduate School has been to improve the Federal Service by providing needed educational opportunities for Federal employees. The Graduate School now offers a resident evening program in Washington and a small correspondence program. It develops for Federal departments and agencies special courses, institutes, workshops, and the like. It presents lectures series and offers educational and vocational counseling. Graduate study is the primary interest of the School, but it also has a large undergraduate program. Graduate School classes are open to all qualified employees of the Federal Government and to other qualified persons as facilities permit.

Founding of the School

The statute that established the Department of Agriculture in 1862 gave it the responsibility to "disseminate agricultural information in the broadest sense of the word." Thus, from the beginning, employees of the Department were educators, and it soon became apparent that if they were to be successful, they needed opportunities to continue their training while employed.

In 1898, Secretary of Agriculture Wilson expressed the need of the Department for an organization such as the Graduate School, particularly to provide post-entry education for young scientists coming into the Department's research programs. No action, however, was taken at that time. Shortly after World War I, when the need for qualified personnel became acute throughout the government, the Congressional Joint Committee on the Reclassification of Salaries recommended that the government departments give more attention to the development of opportunities within the Federal Service for the continuing education of their employees. Accordingly, the Secretary of Agriculture appointed in 1920 a special committee to explore the matter. After considering the committee's findings and consulting leading educational institutions and other government agencies, the Secretary established the Graduate School in 1921 and announced at that time: "I believe those who may be able to avail themselves of this opportunity will both enrich themselves and enhance the value of the service they render."

Accredited Standing

The Graduate School does not grant degrees and has never sought that authority. It prefers to give courses of standard graduate and undergraduate grade; to have the merits of these courses judged by the well-known competence of its instructors; and to cooperate with institutions that have the authority to grant degrees. Students should consult *in advance* with these institutions if they wish to receive credit for courses taken in the Graduate School.

The United States Civil Service Commission accepts Graduate School credits, for examination and qualification purposes, on the same basis as those from accredited colleges and universities.

Administration

The government of the Graduate School is vested in a General Administration Board appointed by the Secretary of Agriculture. The functions of this Board correspond in general to those of boards of trustees of universities. The School is administered by a director and a small administrative staff. It is a nonprofit institution and receives no Federal funds.

The evening program in Washington is organized into nine departments. Each department is directed by a departmental committee composed of an appointed chairman and others of recognized competence in the respective fields. These committees are responsible for organizing and giving general administrative direction to the programs and activities of the departments. Within the departments, depending on the scope and specialization of the programs, are divisional committees. The nine department chairmen, together with the chairman of the committee on special programs, and the Director make up the Graduate School Council. Similar committees direct other Graduate School programs.

Teaching

The faculty of the Graduate School is recruited principally from scholars employed in the Federal service. Most of the faculty members have had experience as teachers in colleges and universities throughout the country before coming into their positions in the Federal Government. Their desire to keep academic contacts and their liking for teaching attract them to evening classes offered by the Graduate School. Because they are doing during the day substantially what they teach in the evening, they bring a fresh academic point of view and a practical approach to the class room. There is a challenge in teaching a class of adults that provides additional motivation for the teacher and additional stimulus for the student.

Library Resources

The student body of the Graduate School enjoys the use of the noted library facilities of Washington. In addition to a large library in the Department of Agriculture, containing more than one million volumes on both agricultural and non-agricultural subjects, the students have ready access to the rich storehouses of the Library of Congress, the Smithsonian Institution, the National Archives, and other exceptional special libraries. Supplementing the Department Library is a collection of books supplied directly, as necessary, by the Graduate School.

Public Lectures and Seminars

Public lecture series give Department employees and others an opportunity to hear authorities discuss current problems in agriculture and in other national and world affairs. Lectures that are especially relevant to the needs and interests of Federal employees are given during official working hours.

Special and Pilot Programs, Custom Built Courses and Seminars

In cooperation with a Federal department or agency or group of agencies, the Graduate School will develop on duty or off duty special educational offerings. These include pilot programs, custom built courses, seminars, institutes, workshops, conferences, and short courses. They are designed to help to meet new, difficult, or changing educational and training needs. For more information, contact the Assistant Director, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

Reading Improvement Program

Reading improvement classes meet daily under an agreement with the U. S. Department of Agriculture. A limited number of spaces is available for other Federal departments and agencies, in the day and evening programs. Students may also enroll individually in 2-95—Improving Reading Ability—in the evening program. For more information, contact the Director, Reading Improvement Program, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

Certified Statements of Accomplishment

Certified Statements of Accomplishment are offered in the fields of Accounting, Administrative Procedures, Editorial Practices, Li-

brary Techniques, Meteorology, Oceanography, Public Administration, Statistics, and Surveying and Mapping. A student interested in earning a Certified Statement of Accomplishment in any of these fields should receive approval, from the Registrar, of his proposed program of study. For complete details, see the specific program for each area of study as stated under the Department concerned.

These statements are offered to encourage the student to complete a well-organized program in his chosen field of study or work. Each student who receives a certified statement also is given an informational transcript of his completed program, which he may use as a public record of qualification. At the student's request, an official transcript is sent to an institution or agency designated by him.

Graduate School Publications

Publications of the Graduate School include:

1. A general annual *Catalog*—which contains detailed information about the resident educational program in Washington, D. C.

2. Time Schedule and Supplement, published each semester—fall, spring and summer—which carries added details about the resident educational program in Washington.

3. Books and periodicals, published at irregular intervals containing: original contributions by faculty members; special lectures devoted to the advancement of the arts and sciences; and significant manuscripts prepared by employees of the Department of Agriculture, which the Department has been unable to publish. A partial list of these publications is given on the outside back cover of this *Catalog*.

Correspondence Program

The small correspondence program of the Graduate School is designed primarily for the field employees of the Department of Agriculture, although the courses are open to others as the facilities permit. There are many other courses not offered by the Graduate School that are of interest to Department employees and are available through the correspondence programs of the colleges and universities throughout the country. The Graduate School is happy to assist a student to find courses in which he is interested.

The courses offered by the Graduate School are listed on page 120 of this *Catalog*. Students who wish more information about any of the courses or who wish to register in one of the courses should write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

Regulations and Procedures

Admission

Admission to resident courses in the Graduate School is open to all qualified employees of the Federal Government and to other qualified persons.

Entrance Requirements

Because the Graduate School does not offer degree programs, entrance requirements differ with the level of the course for which the student is registering.

Undergraduate courses, in general, are open to persons who are graduates of a standard high school or equivalent, or who qualify for the course because of satisfactory work experience. For admission to more advanced courses, college work in the same or related field is specified or understood. For other courses, definite prerequisites may be stated. Year courses require the completion of the work of the first semester, or its equivalent.

Federal Training Legislation

Under the authority of the Government Employees Training Act (Public Law 85-507), Federal agencies and departments have authority to pay for training of employees in non-Government facilities when training is necessary and not reasonably available within Government. By training is meant "the provision of opportunities to acquire skill or knowledge related to the work of the respective Federal agencies." The Graduate School is a non-Federal facility, and through contractual arrangements, the tuition fees and related expenses of a Federal employee can be paid by his agency. The student should make these arrangements with his supervisor or personnel office in advance of registration.

Veterans

Graduate School resident courses are available to veterans under the provisions of Public Laws 550 and 634. Registration for part-time study is charged against educational benefits only in the proportion that the number of semester hours bears to a full normal load.

Veterans who are re-entering Graduate School classes after an interruption of training, or who are entering the Graduate School for the first time, are advised to consult the Registrar of the Graduate School in advance of registration so that a program can be

determined and the necessary arrangements made with the Veterans Administration.

Scholarships

Each semester the Graduate School offers scholarships, in the form of free tuition for one course, to persons who are the principal participants in the interdepartmental management intern programs operated by the Civil Service Commission. There are also available a limited number of similar scholarships for qualified Federal and District Government employees. Applications for these scholarships should be made by May 15 to the personnel offices of the Federal departments and agencies. The recipients will be selected by the Scholarship Committee of the Graduate School from the nominations presented by the agencies.

Counseling Services

Officers of the Graduate School are available, throughout the registration periods and from 9:00 a.m. to 5:00 p.m. each week day, for counseling on educational plans, whether courses are to be pursued in the Graduate School, or in other institutions. In addition, a counseling and testing service is available upon the payment of a fee. Appointments for this service should be made in advance.

Transfer of Credit

Careful planning is important for any prospective student, but particularly so for the Federal employee who wishes to make a substantial beginning in his educational program through the Graduate School, where degrees are not granted and credits must eventually be transferred to a degree-conferring institution. A student cannot assume that credit for work done at the Graduate School will be accepted by any particular college or university. Universities generally accept transfers of credit on the basis of the individual courses taken, the student's over-all program, and the quality of the work done by the student.

The student who wishes to take an advanced degree should consult *in advance* the dean of the graduate school of the institution where he expects to become a candidate for a degree. He should obtain approval for any courses in the Graduate School that he plans to use toward his degree. The student who is deficient in basic undergraduate courses needed as a foundation for his graduate program will find many of them available in the large undergraduate program of the Graduate School. Others may be found in local universities.

A student who is planning work toward an undergraduate degree should consult *in advance* the dean of the institution from which he expects to receive the degree if he wishes credit toward the degree for work taken at the Graduate School.

Registration

The registration period for each semester is shown on the school calendar on the inside front cover. A late fee for each course is charged for registration after the opening of the semester. After the second week of classes in the fall and spring semesters, and after the first week in the summer session, students may register for credit only with the approval of the instructor and the Registrar. Registration is not completed until the required fees have been paid.

Course Load

Students employed full time may carry more than two courses only with the permission of the Registrar.

Fees

Course Fees. In general, fees are computed at $12.00 per semester hour credit.

Late Fees. There is a $2.00 late registration fee and a $1.00 late transfer fee for each course as shown in the School Calendar.

Reinstatement Fee. Students who fail to meet payments when due are charged a reinstatement fee of $2.00 for each course in addition to all accrued fees.

Laboratory Fees. Laboratory or materials fees are listed in the Schedule of Classes for each semester, in connection with the courses for which they are charged.

Service Fee. A fee of $1.00 for each course is charged each student using the deferred payment plan.

Transcript Fee. There is a fifty cent fee for each copy of a student's record on the regular Graduate School form or on the form of another institution or state board of education.

These are current fees and are subject to change.

Payment of Fees

Fees are due and payable in advance at the time of registration. Registration is not complete, and no student is permitted to attend classes until all fees have been paid.

An arrangement can be made at the time of registration for payment of fees in two installments, one half and a service fee at the

time of registration, and the balance by the end of the fourth week in the fall and spring semesters, and by the end of the second week in the summer session. After the first two weeks of classes, fees must be paid in full at the time of registration.

A student who fails to meet payments when due will be suspended and may not attend classes until he has been reinstated and has paid all accrued fees as well as a reinstatement fee of $2.00 per course.

All fees are payable at the Graduate School business office, Room 1031, South Building, United States Department of Agriculture.

Federal Income Tax Deductions

In accordance with an Internal Revenue Service regulation of April 5, 1958, expenses for education are deductible if they are undertaken for the purpose of "maintaining or improving skills by the taxpayer in his employment." This regulation will in many instances be applicable to courses taken in the Graduate School.

Attendance at Classes

Students are expected to attend all class sessions and not to absent themselves without adequate reason.

Absences do not relieve the student from responsibility for work required while he was absent, and the burden of proof that the work was done rests with the student. In courses in which the work cannot be satisfactorily tested by written examination, the instructor shall be the judge of the relation of the student's attendance or nonattendance to his grade. A student registered for credit who is absent more than 25 per cent of the class periods receives a mark of "W," withdrawn, unless he makes up all required work. Auditors who are absent more than 25 per cent of the class periods receive the mark of "W."

Credit and Grades

Academic Credit. Persons registering for academic credit must satisfy all prerequisites for admission to the course as generally stated or specified in the course description.

Audit. An auditor must meet the same prerequisites as a credit student. He receives full privileges of class participation if he chooses to exercise them. An auditor does not receive a grade; he receives only a mark of AUD.

Change from Audit to Credit. A student may change his registration from audit to credit, or vice versa, within thirty days after

the beginning of the semester in the fall and spring, and within three weeks after the beginning of the summer session. The request for change must be made in writing to the Graduate School. Special forms are available at the School Office.

Grades. At the close of the semester students receive written notice by mail of grades received. The following letter grades are used:

A	Excellent
B	Good
C	Fair
D	Passable
F	Failure
Aud	Auditor
Inc	Incomplete
W	Withdrawn

Transcript of Credit

Inclusion in Personnel Record for Department of Agriculture Employees. To aid in effecting its promotion-from-within policy, the Department has provided (USDA Administrative Regulations, Title 8, Chapter 42, paragraphs 1548–1551, dated 10–13–48) that a record of Graduate School credits earned by its employees will be placed in official personnel files of the agency. Unless specifically requested by the employee that such action not be taken, the Graduate School will forward, upon completion of the courses or at the end of the year, a copy of the student's record, without cost to the employee, to the personnel officer of the unit of the Department of Agriculture in which the student is employed.

Transcripts for Employees of Other Agencies. Students who are not Department of Agriculture employees may obtain transcripts for their personnel files or for other purposes by requesting them in writing from the Graduate School, with the payment of fifty cents for each transcript.

Withdrawal and Refunds

Application for withdrawal from Graduate School classes must be made in writing to the Registrar. A form for this purpose is available in the Graduate School Office. *To report the dropping of a course to an instructor does not constitute an official withdrawal.* Permission to withdraw will not be given to a student who does not have a clear financial record.

Refund of tuition fees only will be granted in cases of official withdrawal according to the following schedule:

Fall and Spring Semesters	*Refund*
During first and second weeks of term	Tuition less $5.00 per course registration fee.
During third and fourth weeks of term	60 per cent of total tuition (A minimum of $5.00 per course will not be refunded.)
During fifth and sixth weeks of term	50 per cent of total tuition.
Summer Session	
During first week of session	Tuition less $5.00 per course registration fee.
During second week of session	60 per cent of total tuition (A minimum of $5.00 per course will not be refunded.)
During third week of session	50 per cent of total tuition.

Refunds will be computed as of the date the application for withdrawal is received in the Graduate School Office. In no case will tuition be reduced or refunded because of non-attendance at classes. No refund will be made of laboratory or other incidental fees.

Because commitments for instruction and other arrangements are necessarily made in the beginning of the semester, no refunds for any reason can be made except in accordance with the above schedule.

The Graduate School reserves the right to cancel any course if registration does not warrant continuance; to limit, to discontinue, to postpone or to combine classes; to change instructors; to change classroom assignments; to make any changes deemed advisable in registration and in fees; and to require the withdrawal of any student at any time for such reasons as the School deems sufficient.

Courses of Instruction

Courses offered during the academic year 1960–61 are listed in the following pages by departments of instruction. The departments are listed alphabetically.

The words Fall, Spring and Summer show the semester in which the course is offered. The number of credits shows the value of the course in semester hours. Bracketed numbers show courses that will not be offered in 1960–61.

Courses numbered 1–100 are non-credit; 100–399, undergraduate; 400–699, advanced undergraduate (senior) and graduate; above 699, graduate only.

Biological Sciences

DEPARTMENTAL COMMITTEE

E. L. LeClerg (Chairman)

Justin M. Andrews
Ronald Bamford
Lawrence V. Compton
Dorland J. Davis, Jr.
Charles G. Durbin
Geoffrey Edsall
N. R. Ellis
LeRoy D. Fothergill
Edwin R. Goode, Jr.
Edward F. Knipling
Daniel L. Leedy
Ralph S. Muckenfuss
Arthur M. Silverstein
Martin G. Weiss
Mark W. Woods (Vice-chairman)

—o—

Scientific efforts have been greatly intensified in recent years with the result that research discoveries have a direct bearing on the activities of every individual and organization. Many government workers in fields only indirectly related to biology often need an understanding of basic principles in the biological sciences to do a competent job in their own fields. On the other hand, government workers in the biological sciences are continually faced with the problem of keeping abreast of the rapid advances in the application of these principles and new gains in basic knowledge.

The Department of Biological Sciences has arranged a series of courses to meet the needs of each of these groups. Unless laboratory work is specified, the courses are non-laboratory. The advanced courses are taught as seminars. All courses are taught by oustanding specialists from Federal and other research institutions.

In addition to the courses listed below, the Graduate School offers a number of courses in the biological sciences at the National Institutes of Health in Bethesda. These courses may be found on page 110 of this catalog.

—o—

1-90. Basic Principles of Laboratory Animal Care

Year, non-credit — Berton F. Hill and Associates

Designed to provide a background of basic biological concepts for animal colony supervisors and caretakers and medical laboratory technicians, especially in relation to common laboratory animals. First semester: subjects to be covered include life and living organisms, skeletal, muscular, circulatory, respiratory, digestive, excretory, nervous and endocrine systems, reproduction, genetics and breeding, nutrition, and metabolism. Second semester: subjects to be covered include infectious disease, disease control and therapy, sanitation and sanitary procedures, animal handling, practical diagnostic methods, and animal dissection. Students may register for the second semester without having completed the first if they have training in high school biology.

1-126. Medical Terms Simplified

Fall, 2 credits — Louise E. Bollo

Designed for medical secretaries, librarians, coders, and other workers in the health field who deal with technical medical terms. Particularly names of diseases, their causes, and how they are classified. Study of the anatomical location of disease processes. Previous experience in health work helpful, but not required.

1-95. How Plants Grow

Spring, non-credit — Richard S. Cowan

To assist the backyard gardener to an understanding of the plants he grows. Such topics as nutrition and reproduction of plants, structure and function of plant parts, characteristics of major plant groups, and plant geography will be included. The course will be presented in nontechnical terms in so far as possible. Some laboratory observation will be incorporated. No prerequisites other than general interest and genuine curiosity in the biology of the Plant World.

1-215. Systematic Botany of Wild Flowers

Summer, non-credit — Richard S. Cowan

An elementary, nontechnical course, without prerequisites, designed to enable the student to determine the names and relationships of wild and cultivated plants in the vicinity of Washington, D. C. The study will consist principally of directed laboratory, following the introductory background lectures. Weekend field trips will be conducted to nearby areas to learn proper methods of collecting and preserving plant materials and to observe plants in their natural surroundings. Laboratory will be devoted largely to the identification of these collections, using less technical texts. An inexpensive book and magnifier with seven to ten times magnification will be required.

[1-427.] Physiology of Bacteria

Year, 2 credits each semester — Arthur K. Saz

The basic pathways of carbohydrate, protein, fat and amino-acid metabolism. Nutrition of microorganisms. Relationship to higher forms.

Topics covered also include biochemistry of nitrogen fixation, utilization of mutants for elaboration of metabolic pathways, and current status of modes of actions of antibiotics. *Prerequisite:* Organic chemistry, or biochemistry, or the consent of the instructor.

1-570. Design of Experiments in Biological Sciences

Year, 2 credits each semester — E. James Koch

A course in the principles of planning and analyzing animal and plant experiments. The basic design principles of completely randomized, randomized block, Latin Square, factorials, confounding, split plot, lattices, incomplete blocks and other designs are fully discussed and illustrated with student problems. The principles and application of correlation, regression, covariance, multiple regression, experimental and sampling errors, components of variance, missing data, mean separation, individual degrees of freedom, size or plot, and size of experiment to experimental design are studied. Problems of special interest to the students are considered. This class meets in the personnel conference room, Plant Industry Station, Beltsville, Maryland. *Prerequisite:* A course in experimental statistics, several years experience in applying the principles of statistics to experimental data, or the consent of the instructor.

1-603. Advances in Plant Breeding and Genetics (1960–61 and every third year)

Fall, 2 credits — MARTIN G. WEISS and SPECIALISTS

Methods of breeding naturally self- and cross-pollinated plants, theories of early generation testing, nature and use of heterosis in plant breeding, techniques of self-pollination and hybridization, and plant improvement through interspecific hybridization and polyploidy. *Prerequisite:* Basic knowledge of genetics and plant breeding.

1-699. Workshop in Natural Science Teaching Techniques

Fall, 3 credits. Repeated in Summer — CHARLES J. GEBLER

Designed to provide elementary school teachers, youth leaders, and other interested persons with a foundation in the natural sciences and Conservation. Emphasis on teaching techniques, including units on taxonomy, classroom projects, field leadership, and local and national resources and materials. Lectures, demonstrations, discussions, laboratory, and field work. Suitable for students with little or no background in the natural sciences. By special arrangement, students may register on an individual basis for guidance in the above and related fields. A student may elect undergraduate or graduate credit depending upon his background.

SPECIAL PROGRAM IN PLANT QUARANTINE STUDIES

The following courses form a special in-service training program in plant quarantine studies, and are given at the New York City facilities of the Division Training Center, Plant Quarantine Division, Agricultural Research Service. The program is under the supervision of Ira A. Lane, Training Officer, Plant Quarantine Division, Agricultural Research Service.

1-515. Plant Quarantine Entomology

Schedule to be arranged, 6 credits

THOMAS G. DARLING, MAYNARD J. RAMSAY, IRA A. LANE

A concentrated, technical course in entomology especially designed to fill a need on the recognition to family of immature forms frequently encountered in plant quarantine work; to familiarize the participant with insect pests, the hosts, distribution and avenues of entry to notoriously dangerous forms not known to be established or widely distributed in the United States.

1-535. Basic Training for Plant Quarantine Inspectors

Schedule to be arranged, 10 credits — THOMAS G. DARLING, IRA A. LANE, WILLIAM FRIEDMAN, CHARLES S. TUTHILL

A consecutive 26-week program for new Federal plant quarantine inspectors designed to orient the new employee in the Department of Agriculture, its organization, function and basic personnel policies; basic legislation and other legal authorities affecting plant quarantine operations; principles of plant quarantine enforcement; Federal-State relationships; inspection and treatment techniques and procedures; technical aspects of foreign pest evaluation; identification and distribution in the fields of entomology, plant pathology, and nematology as applicable to foreign plant quarantine enforcement; commodity recognition as applicable to plant materials moving in international commerce.

1-615. Plant Quarantine Pathology

Schedule to be arranged, 4 credits — Charles S. Tuthill

A specially designed program for regulatory officials interested in quarantine phytopathology. Emphasis is placed on detection, recognition, and nomenclature of disease-causing organisms frequently encountered in plant quarantine operations, particularly those not known to occur or be widely distributed in the United States.

1-708. Plant Quarantine and Plant Protection

Schedule to be arranged, 10 credits — Maynard J. Ramsay

A special course arranged for foreign trainees who are studying plant quarantine methods in the United States. Includes study of the interrelationships of agencies of the U. S. Department of Agriculture, regulatory and control organization and policy, basic quarantine legislation, fundamental principles affecting promulgation of quarantines and restrictive orders. Field observations and participation in operational activities of the Plant Quarantine Branch at ports of entry. Review and observation of field control projects and quarantine operations in the Northeast, Southeast, and Southwest Regions.

1-709 Plant Quarantine Nematology

Schedule to be arranged, 6 credits — William Friedman

Graduate level study and practice in the detection, isolation, preparation, and identification of nematodes of plant quarantine significance. Special emphasis on host relationships, world distribution, and applicable treatments. Guest lecturers.

Special Program in Soil Salinity

1-540. Soil Salinity

Schedule to be arranged, 4 to 6 credits — Lowell E. Allison

A special course for foreign trainees in principles and practices for the diagnosis and improvement of saline and alkali soils. Emphasis is placed on familiarizing qualified personnel with the principles and methods currently in use. The course is offered at the U. S. Salinity Laboratory, Riverside, California.

Languages and Literature

DEPARTMENTAL COMMITTEE

J. KENDALL MCCLARREN (Chairman)

J. P. BLICKENSDERFER
ERWIN JAFFE
FOSTER E. MOHRHARDT
LIONEL W. NELSON
KENNETH W. OLSON
FRANKLIN THACKREY (Vice-chairman)
JOHN WAHLGREN

IMPORTANCE OF ENGLISH, WRITING, AND SPEECH

Among students preparing for technical careers and among busy people employed on the basis of their technical competence, there is an inevitable tendency to concentrate on subject-matter specialties. Technical knowledge is of no value, however, unless it can be communicated to others. It is common knowledge in the Government service and in industry that nothing so much retards the progress of many young technicians, scientists, and other professional personnel as their inability to write and speak effectively.

CERTIFICATE OF ACCOMPLISHMENT IN EDITORIAL PRACTICES

Certified Statements of Accomplishment in Editorial Practices are granted to students who have completed an organized course of study intended to provide basic training for responsible editorial and publications work. The program leading to this certificate should be of special interest to persons who wish to enter editorial work and to those now employed in editorial or publications work who wish to prepare themselves for job advancement.

Persons who wish to enter the profession should have a good general educational background. It is recommended that students who wish to work toward the certificate have at least two years of college work, preferably a college degree, or work experience in a subject matter field.

Requirements

Students seeking this certificate should consult with the Registrar and obtain approval of their proposed course of study early in their academic program. Equivalent courses will be accepted by transfer from other institutions.

1. A demonstrated facility in English grammar and composition. This requirement may be met by successful completion of an examination to be given as a part of the course, Principles of Editing.

2. Twenty-four semester hours of credit with an average grade of "B" or better in the following courses:

   a. Required courses: (15 credits)

   Principles of Editing (3)
   Advanced Practice in Editing (3)
   Printing Procedure and Layout Design (2)
   Editing Technical Manuscripts (2)
   Producing the Popular Publication (2)
   Problems in Editing (3)

   b. Editing Electives: (6 credits selected from the following)

   English Language
   Official Writing
   The Written Word in Official Communication
   Readable Writing
   Technical Writing
   Basic Reference Service and Reference Tools
   Introduction to Bibliographic Science
   Indexing
   Graphic Methods of Presenting Statistics
   Feature Writing
   Graphic Arts in the Federal Government

   c. Subject Matter Electives: Remaining hours of credit in subject matter courses as recommended by the student's employer or as selected by the student. May be selected from the Editing Electives listed above if they are appropriate to the position for which the student is preparing. This requirement may be waived for students who have college work or acceptable experience in a subject matter field.

Certified Statement of Accomplishment in Library Techniques

A Certified Statement of Accomplishment in Library Techniques is granted to a student who has completed an organized course of study intended to provide basic training in this field. Graduation from high school, or the equivalent, is the minimal educational background required. An applicant for the certificate must file a transcript of his high school or college record before completion of his certificate program.

A student seeking this certificate should consult with the Registrar and obtain approval of his proposed course of study early in his academic program. Equivalent courses will be accepted by transfer from other institutions.

Requirements

1. A demonstrated facility in English grammar and composition. This requirement can be met by the successful completion of an examination given as part of the course, Introduction to Library Service, or by taking one of the courses in English offered by the Graduate School.

2. Twenty semester hours of credit with an average grade of "B" or better in the following courses:

a. Required courses: (15 credits)
Introduction to Library Service (2)
Introduction to Cataloging and Classification (2)
Cataloging and Classification II (2)
Principles of Library Organization (2)
Basic Reference Service and Reference Tools (2)
Introduction to Bibliographic Science (2)
Seminar in Library Techniques (3)

b. Electives (5 credits)
A Foreign Language
Administrative Procedure
Documentation
Information Practice in Science and Technology
Latin for English
Law Librarianship
Literature of Meteorology
Medical Terms Simplified
Official Writing
Principles of Editing and Their Application

Other courses may be approved depending upon the needs of the student.

—o—

ENGLISH—GRAMMAR AND WRITING

2-35. English for Secretaries—Rapid Review

Summer, non-credit

JAMES O. HARMON
ALLEN H. JONES

Sentence structure, capitalization, punctuation, vocabulary, and spelling.

2-25. Increasing Your Learning Efficiency

Fall, non-credit. Repeated in Summer — George R. J. Weigand

Designed to teach improved techniques and methods of the learning process and to reduce to minimum learning time and effort. Useful to parents and teachers in acquiring techniques and methods for training younger persons and to supervisors in job training.

2-95. Improving Reading Ability

Fall, non-credit. Repeated in Spring and Summer — George L. Stevens

An advanced or developmental reading program for the average and superior reader, designed to help each student become more selective, more flexible, more purposeful, and more rapid in what he reads. Training is highly individualized. The course begins with an analysis of present reading, vocabulary, and visual abilities to help each individual determine areas in need of development. Each student works and progresses at his own rate. Classroom instruction consists of workbook exercises, periodic progress checks, short talks on principles of efficient reading, and practice on individual training aids. Final tests are given to aid in determining progress made and areas needing further development.

2-112. Practical English Usage

Fall, 2 credits. Repeated in Spring and Summer — James O. Harmon, Allen H. Jones, Douglas J. McMillan, Dorothy P. Pritzker, William H. Struhs, Jr.

Refresher course in English grammar and usage. Exercises in analyzing sentences give students the basic knowledge of sentence structure and grammar that is required for more advanced courses in grammar and writing. Exercises in correct usage and punctuation.

2-119. Vocabulary Building

Fall, 2 credits. Repeated in Spring and Summer — Allen H. Jones, Hamill Kenny, William H. Struhs, Jr.

Study of the sources and origins of words in order to gain insight into their present meanings. Principles of word formation; dictionary study and exercises in word selection. The course stresses the most common Latin and Greek roots used in forming English words.

2-222. English Composition

Year, 3 credits each semester — James O. Harmon, Allen H. Jones, William H. Struhs, Jr.

Equivalent of college freshman English. An introductory course in writing and English usage, designed especially for those who need a course preparatory to more advanced English studies. Special attention given to the fundamental principles and mechanics of good writing—grammar, punctuation, spelling, diction, and the like. Exercises in writing short and long themes and in studying, analyzing, and evaluating selected English prose texts. *Prerequisite:* High school English, or the equivalent.

2-223. Descriptive English Grammar

Fall, 3 credits — Susan E. Harman

A course in the study of grammatical principles, stressing sentence structure and correct English form. Lectures on the history and development of inflec-

tional and derivational forms. Exercises in diagramming and in analyzing examples of good and bad English. *Prerequisite:* College freshman English, or the equivalent.

2-250. College Rhetoric

Spring, 3 credits — Philip Eisenberg

The art of writing and rules for presenting ideas in clear, vigorous prose. Exercises in the composition and analysis of effective writing. *Prerequisite:* One year of college English, a course in college grammar, or the consent of the instructor.

2-251. English Language

Spring, 3 credits — Douglas J. McMillan

Introductory course in the history of our language. Sound and inflection changes within the language itself. Political, social, and intellectual forces that have determined its development. The aim is to provide by lecture and discussion a sound basis for an understanding of English as it is used today in the United States. In addition to reading the text and contributing to discussion, each student is expected to submit a term paper on an assigned topic. These will be read and discussed in class. *Prerequisite:* College freshman English, or the equivalent.

2-224. Readable Writing

Spring, 2 credits — Amy Cowing, Ruth Nordin

Teaches you how to write for the layman: how to communicate ideas in words that average readers can and will read; how to plan and write bulletins and letters that laymen find easy to read; and how to use current readability formulas to check the readability of your writing. Deals briefly with layout of publications and use of illustrations as aids to reading. Lectures, discussions, and workshop sessions in which students make practical application of principles of writing.

2-226. Official Writing

Fall, 2 credits. Repeated in Spring — J. Kendall McClarren, Wilbert Schaal

This course covers the principle that official government writing, as all writing, should be clear, simple, concise, and easy to understand. Emphasis is on eliminating needless words and phrases in official writing. Many forms of government writing are covered, including articles, reports, letters, and memoranda. The course is designed for those who are not necessarily professional writers, but who have to do some writing as part of their jobs. Several short writing assignments are required. *Prerequisite:* College freshman English, or the equivalent in writing experience.

2-227. The Written Word in Official Communication (1960–61 and alternate years)

Spring, 2 credits — J. Kendall McClarren

This course is a continuation of Official Writing. It stresses writing as an effective tool in official communication and is intended to meet the needs of nonprofessional writers who prepare reports, scripts, and releases, requiring a working knowledge and application of writing techniques. The course covers: (1) pre-writing: gathering, organizing, and outlining basic subject matter; (2) drafting: logical development into informative prose of the materials outlined; and (3) reviews: checking the order of arrangement and content, style, structure, and readability. Practice in writing will be emphasized. *Prerequisite:* Official Writing, or the equivalent.

2-230. Sentence Revision

Spring, 2 credits — Dorothy P. Pritzker

Designed for students who wish to improve their writing. Review of the grammatical elements of the sentence, a study of established patterns of sentence construction, and constant practice in rewriting sentences. *Prerequisite:* Completion of Practical English Usage, Descriptive English Grammar, or the equivalent.

2-235. Fiction Writing

Fall, 2 credits. Repeated in Spring — Olga Moore Arnold, Patricia McGerr

Stresses such fiction fundamentals as plotting, characterization, dialogue, story organization, testing readability and interest, and increasing dramatic quality of writing. Emphasizes writing techniques that increase salability of student manuscripts by discussing editorial taboos, ways to obtain salable story ideas, and methods of marketing manuscripts.

2-242. Advanced Fiction Writing

Spring, 2 credits — Olga Moore Arnold

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Fiction Writing, or the equivalent.

2-280. Feature Writing

Fall, 2 credits — Marie A. Dolan, Harold H. Sours

Stresses how to find article ideas, how to do the research necessary to develop them into salable articles, best methods of presentation of material, ways to polish writing to make it more salable, ways to determine magazine needs, how to slant material for particular magazines, and how to test readability and interest of writing.

2-281. Advanced Feature Writing

Spring, 2 credits — Marie A. Dolan, Harold H. Sours

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Feature Writing, or the equivalent.

2-450 Technical Writing

Fall, 2 credits — Maurice Fried, Marguerite Gilstrap, Ward W. Konkle, Ruth Nordin

A course designed to help scientists and economists improve their research reports and articles for professional publications. The first three weeks are devoted to a survey of the fundamentals of writing the technical report: its characteristics, parts, functions, the steps in preparation, the process of criticism, The remainder of the term is spent in the preparation, criticism, and revision of reports and articles—written for official use when possible. *Prerequisite:* Undergraduate degree in one of the sciences, engineering, economics, or similar technical field.

4-330. Government Letter Writing (*See* p. 51)

4-421. Writing Procedures and Instructions (*See* p. 51)

Literature

2-330. Great Books

Year, 2 credits each semester * M. Clare Ruppert

* Students may attend both semesters or either semester.

Group discussion, under leadership, of important works in poetry, history, philosophy, and criticism. The leader will try to help with the reading and understanding, but the books themselves will be the teachers. The intention of the course is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The only qualifications required are an interest in ideas and belief in free discussion. With few exceptions, the books will be read in their entirety. One, two, or three meetings will be given to a book, depending upon its length. Discussion will center around the following authors:

Reading List A (1960–61 and alternate years)

Fall Semester: Bible, *Ecclesiastes;* Homer, *Iliad;* Aeschylus, *Oresteia;* Sophocles, *Oedipus at Colonus;* Plato, *Symposium* and *Republic,* Bk. VI–VII; Aristotle, *Ethics;* Thucydides, *History of the Peloponnesian War;* Epictetus, *Discourses* (Selections); Lucretius, *On the Nature of Things.*

Spring Semester: Bible, *Gospel According to St. Matthew;* Shakespeare, *Macbeth;* Milton, *Areopagitica;* Adam Smith, *Wealth of Nations;* Descartes, *Discourse on Method;* Swift, *Gulliver's Travels;* de Tocqueville, *Democracy in America;* Thoreau, *Civil Disobedience;* Kant, *Perpetual Peace;* Mill, *On Liberty;* Twain, *Huckleberry Finn.*

Reading List B (1961–62 and alternate years)

Fall Semester: *Declaration of Independence;* Bible, *Book of Job;* Homer, *Odyssey;* Sophocles, *Antigone* and *Oedipus Rex;* Plutarch, *Lives: Alexander and Caesar;* Plato, *Apology* and *Crito;* Aristotle, *Politics,* Bk. I; Marcus Aurelius, *Meditations;* St. Augustine, *Confessions;* St. Thomas Aquinas, *On the Law.*

Spring Semester: Dante, *Divine Comedy;* Machiavelli, *The Prince;* Shakespeare, *Hamlet* and *King Lear;* Hobbes, *Leviathan;* Rousseau, *Social Contract;* Locke, *Civil Government; Federalist Papers;* Marx, *Communist Manifesto.*

2-331. Significant Books of the Twentieth Century

Summer, 2 credits M. Clare Ruppert

These books will be discussed in the light of their influence upon twentieth century man, his thought and behavior in our contemporary society.

Reading List

James, *Pragmatism;* Frazer, *Golden Bough;* Dewey, *Democracy and Education;* Keynes, *Economic Consequences of the Peace;* Proust, *Remembrance of Things Past* (vol. 1); Joyce, *Ulysses;* Mann, *Magic Mountain;* Spengler, *The Decline of the West;* Freud, *Basic Writings;* Toynbee, *Study of History* (1 v. abridged)

Information Methods

2-220. Indexing

Fall, 2 credits — Kathryne B. Kozak

This course is intended primarily for those interested in making indexes for periodicals, bulletins, reports, and books. Emphasis will be placed on general procedures and matters of policy as well as on basic principles and techniques. Specific types of indexing adapted to various subjects and popular style, contrasted with technical and scientific styles, will be studied. Examples of different kinds of indexes will be shown and opportunity given for practical work in the preparation of indexes, including the making of cross references, alphabetizing, and editorial preparation of index cards and manuscripts for the printer. *Prerequisite:* A knowledge of library or editorial work is desirable.

2-225. Principles of Editing and Their Application

Fall, 3 credits. Repeated in Spring — Catherine F. George and F. L. Erhardt, Nicholas A. Kominus

Intended primarily as a survey course for those seeking information on editorial techniques involved in handling manuscripts after they leave the author's hands and until they are issued in printed form. Discussion of the fundamental principles of editing, including the organization or rearrangement of material for effective presentation; rhetorical style in relation to subject matter; word forms, sentence structure, and effective use of English; the Style Manual of the Government Printing Office; considerations governing titles, tables of contents, headings, footnotes, illustrations, literature citations and bibliographies, and statistical checking; the principles of table formation and arrangement; the relation of type to subject matter and the techniques of printing; and the fundamentals of indexing and proofreading. Opportunity is afforded to apply these principles in practical work in editing, which is then discussed in class. A trip to the Government Printing Office is arranged to note and study operations there.

2-360. Advanced Practice in Editing

Spring, 3 credits — Geniana R. Edwards and Specialists

Advanced instruction in literary and statistical editing and handling of graphic materials. Students will edit a practice manuscript requiring reorganization, extensive editing, and uniform styling. Several Government agency styles for citation, tables, graphics, and other details will be compared, and adaptation of style meeting special requirements yet conforming to Government Printing Office rules will be studied. Administrative procedures for work on pamphlets, magazines, etc., will be outlined. *Prerequisite:* Principles of Editing and Their Application, or the consent of the instructor.

2-237. Printing, Layout, and Design

Spring, 2 credits — Elmo J. White

Printing processes and printing media; composition; book binding; typography and design; printing types; illustrations, including photo-engraving process and photographs; printing design, rough layouts, finished layouts, methods of copy fitting; printing for the Government, including agency responsibility, GPO responsibility, and agency procedure for procuring printing; other printing media, including silk screen, ozalid, varitype, cold-type processes, and others; regulations and specifications of the Joint Committee on Printing, GPO paper catalog, Style Manual, printing, and binding regulations.

The course is intended for those who plan, prepare, or procure printing, duplicating, and distribution of books, pamphlets, folders, posters, charts, forms, and other printed or duplicated matter.

2-412. Editing Technical Manuscripts

Fall, 2 credits JAMES G. NOLAN

The role of the editor, including necessary qualifications, the human relations aspect, relative responsibilities of the editor and author, and the ethical and practical basis for editing. Editorial evaluation of technical manuscripts, including organization of functional parts, sound procedural reasoning, correlation with technical work, style requirements, critical review, and preparation for reproduction. *Prerequisite:* Principles of Editing and Their Application, or the equivalent.

2-415. Producing the Popular Publication

Fall, 2 credits. Repeated in Spring DENNIS S. FELDMAN

Between the final editing and the time a pamphlet, brochure, or periodical comes off the press lies a multitude of details designed to enhance the appeal of the publication. The picture editor who lends his talents to make a publication come alive; the artist and layout man who create visual appeal; the caption writer—all these key personnel bring their specialized skills to bear. These fields are examined by means of lecture and workshop. Techniques of preparing a manuscript for a mass audience as well as for specialized audiences are considered. Emphasis on the use of techniques that combine appeal with readability through extensive use of graphic materials. Production of low-budget publications reviewed. Students may bring to class problems or materials on which they are currently working. *Prerequisite:* Principles of Editing and Their Application, or the equivalent.

2-430. Problems in Editing—Seminar

Spring, 3 credits JEROME H. PERLMUTTER

This course deals with the editorial problems that may arise in the planning, preparation, production, and printing of publications. *It is designed for the working editor, or the student who has successfully completed previous editorial course work.* Emphasis is placed on the on-job-problems of each individual. These are discussed in detail, and suggestions and recommendations are made for solutions. An analysis will be made of your particular publication. Organization of manuscripts, sentence structure, and direction of material for the proper audience are considered. Time is devoted to the relationships between editors and authors, artists and administrators. Management methods for improving publication flow are discussed. A field trip to a printing plant or editorial office is arranged. *Prerequisite:* Completion of the other courses required for the Certificate of Accomplishment in Editorial Practices, working publications editor, or the consent of the instructor, especially if a schedule conflict has prevented completion of the required courses.

[2-065.] U. S. Government Film Policies, Procedures, and Problems—Seminar

Fall, non-credit SEERLEY REID and R. LYLE WEBSTER

Study and subsequent discussion of such problems as the extent of Government assistance to commercial film producers, methods of calculating film production costs, Government exchange of film materials and rights, price differentials in film contracts, personal credits on Government films, and the like. Government-wide policies and procedures will be studied in terms of legal considerations, program operations, and principles of public administration. Background fact papers will be prepared by selected participants.

Registration is required, but no fees are charged.

2-150. Information Practice in Science and Technology

(*See* p. 29)

2-152. Documentation

(*See* p. 29)

2-243. Using Visuals Effectively

Summer, 2 credits — J. Kendall McClarren, Elmo J. White, David M. Granahan, and Jules Renaud

This course is designed for persons who teach, conduct meetings, or plan visual programs for groups or mass communication. *An art background is not necessary.* The course will emphasize planning and creating simple but effective visuals, using modern techniques and devices. Main topics include: how to analyze an audience; how to develop visual ideas; and application of modern techniques. Demonstrations will be given in the use of motion pictures, closed circuit TV, 3-dimensional visuals, visual cast and various other speaker-controlled devices.

2-425. Speech Writing

Fall, 2 credits — Kenneth W. Olson, Wilbert Schaal, and Hal R. Taylor

A self-improvement course primarily for those who wish to improve their ability to write their own speeches. Presents basic principles of speech preparation: (1) analyzing your audience; (2) determining your theme; (3) organizing subject matter; (4) writing your speech. Based on principles of communication as developed by National Project in Agricultural Communications, Michigan State University. Mainly classroom discussion and some outside preparation of materials for purposes of applying basic principles.

Library Techniques

The following courses are designed as nonprofessional library courses, offering a background of information and training for the sub-professional library assistant and other persons whose work requires a knowledge of these techniques, such as teachers, research assistants, and the like.

2-125. Introduction to Library Service

Fall, 2 credits — Foster E. Mohrhardt and Associates

Basic course for those expecting to pursue the curriculum leading to the nonprofessional certificate. Outlines the purposes, procedures, techniques, development, and trends of librarianship. Includes individual assignments and conferences with students working toward the certificate.

2-135. Introduction to Cataloging and Classification

Spring, 2 credits — Elizabeth L. Tate

Organization of library materials; the card catalog and auxiliary records; cataloging rules and routines; review of cataloging systems; classification routines; and review of classification systems.

2-139. Cataloging and Classification II

Summer, 2 credits — Virginia Cunningham

The course will present methods of cataloging and classifying more difficult materials such as technical reports, filmstrips, microcards, music, maps, and periodicals. It will take into consideration the more philosophical aspects of cataloging such as the theory of subject headings, the purpose of the catalog, and the like.

2-136. Principles of Library Organization

Spring, 2 credits — Joseph T. Popecki

The system and function of a library based on its component parts and services that obtain regardless of size or purpose; the organization of function and service for utmost efficiency.

2-137. Basic Reference Service and Reference Tools

Fall, 2 credits — Jane M. Fulcher

The process of satisfying intellectual inquiry; sources of information; study and comparison of a basic list of 150 reference tools with the exception of general bibliography.

2-138. Introduction to Bibliographic Science

Fall, 2 credits — Joseph T. Popecki

Bibliographic science and bibliographic style for beginners; variations and forms of bibliography; study and comparison of the general bibliographic tools and indexes of chief importance.

2-145. Law Librarianship (1960–61 and alternate years)

Year, 2 credits each semester — Marvin P. Hogan

A survey of source materials for the law library, and a study of library administrative procedures as applied to a law library. The first semester is concerned with source materials: primary authorities and secondary authorities, international law, government publications, and other materials. The second semester is concerned with law library service: organization and staffing, book selection, accessioning, cataloging, reference services, administrative records, and reports. Students may take either or both semesters. *Prerequisite:* Training in law or library work, or equivalent experience.

2-150. Information Practice in Science and Technology

Fall, 2 credits — John Sherrod

A survey of the availability and utilization of scientific and technical information from government, industrial, university, and other sources, both foreign and domestic. Reviews the resources of technical libraries, with particular emphasis on those located in the Washington area. Special problems discussed include information retrieval, technical information services, and technical report literature.

2-152. Documentation

Spring, 2 credits — John Sherrod

Survey of techniques for locating, organizing, and communicating recorded specialized knowledge. Emphasis is placed on the use of non-conventional systems in bibiographic work and their adaptation for special purposes.

2-160. Seminar in Library Techniques

Fall, 3 credits. Repeated in Spring — John Sherrod (Coordinator)

To provide an overall summary and review of the practical problems in library operations. Emphasis is placed on work with the individual student. Special readings in the literature of librarianship. Open only to students who have completed all other requirements for a Certified Statement of Accomplishment in Library Techniques.

Speech

2-228. Public Speaking for Beginners

Fall, 2 credits. Repeated in Spring — Norma Reno Miller

This course is designed for those who need more self-confidence and ability in meeting business, club, church, and social speech situations. Basic steps in organizing material for a speech and preparing to deliver it in a direct and conversational manner. Through speeches and impromptu speaking situations, each student has opportunity to practice before an audience what he has learned, and to receive suggestions from the instructor.

2-229. Advanced Public Speaking

Fall, 2 credits. Repeated in Spring — Lionel W. Nelson

Students enrolling for this course should have had Public Speaking for Beginners or some speech-making experience. Emphasis is placed on determining what one's purpose is in speaking, and accomplishing that purpose effectively. How to be interesting and clear, how to develop and support ideas, and how to handle discussion. Each student speaks and receives personal speech suggestions at each class meeting.

2-232. Voice and Diction

Fall, 2 credits. Repeated in Spring — Berniece Chambers

Intensive drills to improve vocal power, inflection, range, resonance, and consonant clarity. Additional classes include instructions for reading from manuscript, vitality in speech, vocabulary, and word usage. The course will be adapted to the specific needs of the students.

2-236. Remedial Speech

Summer, 2 credits — Berniece Chambers

Techniques to aid in the correction of specific speech problems. A practice course. Individual guidance for each student.

2-425. Speech Writing (*See* p. 28)

Foreign Languages

The Graduate School provides opportunities for instruction in a wide range of foreign languages. It will organize courses in other languages if there is sufficient demand.

2-58. Latin for English

Year, non-credit — Alfred D. Stefferud

Constant emphasis is placed on the learning of Latin as a way to improve the student's knowledge of English forms, grammar, vocabulary, and style. The course may be considered a practical, effective workshop in English usage and in skills useful in learning other languages. The method of presentation assumes no prior knowledge of formal grammar. Attention is paid to cultural values of Latin language and literature. Students are encouraged to read novels in English about Rome and the Romans. Simple sentences and passages from the ageless Roman writers are read. Recordings of Latin songs and stories are played. Help is given students who wish to develop their scientific vocabularies.

2-63. The Main Languages of the World

Summer, non-credit — JACOB ORNSTEIN

The course is intended to familiarize the student with the features of the main languages of the world and their geographical distribution. Basic vocabularies will be presented of the French, German, Italian, Japanese, Portuguese, and Russian languages. Their structures will be discussed. The role of languages in world affairs will be described. *Prerequisite:* Two years of high school or one year of college work in a foreign language.

FRENCH

2-59. Contemporary French Literature and Theatre

Fall, non-credit. Repeated in Spring — GEORGE VICAN

Lecture and discussions on the different trends, thoughts, and problems of the present day French literature and theatre. One of the following writers will be selected for detailed presentation: Camus, Malraux, Sartre, Mauriac, Anouilh, Bernanos, Aragon, Giraudoux, Péguy, Simon de Beauvoir, Maurois, Géraldy. Reading will include at least one novel or one play. Special interests and needs of the students will be taken into consideration. *Prerequisite:* Two years of college French, or the equivalent, or the consent of the instructor.

2-68. Reading French—Grammar Review and Vocabulary Building

Fall, non-credit. Repeated in Spring and Summer — GEORGE VICAN

Basic French grammar, reading and vocabulary building for students who have had some French and wish to review it.

2-87. French for Travelers

Fall, non-credit. Repeated in Spring and Summer — GERMAINE BARGIN, GEORGE VICAN

Acquiring a facility in the use of oral French, including practical, every-day expressions helpful to those who plan a trip to France, or to those who plan to work in a French-speaking country. For persons with or without previous study of the language.

2-253. Elementary French

Year, 3 credits each semester — GERMAINE BARGIN

Provides basic knowledge of French grammar and vocabulary. Reading, translation, dictation, and some conversation. For beginners.

2-254. Intermediate French

Year, 3 credits each semester — GERMAINE BARGIN

Systematic review of French grammar. Writing of French composition, reading, translation, dictation, and conversation. For students who have had one year of college French, or two or three years of average grammatical preparation below college level.

2-255. French Conversation

Fall, 2 credits. Repeated in Spring — GEORGE VICAN

Designed to develop in students a fluent style of idiomatic conversation on topics most likely to be met in travelling in French speaking countries. Grammar review only if deemed necessary. Some composition and dictation exercises. Reading of current French newspapers and magazines. *Prerequisite:* Two years of college French, or the equivalent; a good knowledge of grammar and a sizeable vocabulary.

German

2-66. Reading Scientific German

Year, non-credit — Marianne Lederer, Herbert Schaumann, Charles V. von Luttichau

Designed to offer a student preparing for an advanced degree in the sciences or humanities a practical background for reading and translating German publications in his particular field. No previous knowledge of the language required.

2-88. German for Travelers

Fall, non-credit. Repeated in Spring — Charles V. von Luttichau

Accuracy and facility in the use of oral German through listening to spoken German, reading, word analysis, and particularly repetition of the "basic thousand words" in round-table conversation. Work will be adapted to the members of the class. The beginner will have a chance to acquire a working vocabulary; the more advanced student will have an opportunity to practice the correct use of words, phrases, and idiomatic expressions. For beginners in the language as well as those who have had one year or more of German.

2-259. Elementary German

Year, 3 credits each semester — Marianne Lederer

Essentials of German grammar. Reading and writing simple prose. Introduction to extensive reading. Some conversation. Training in the fundamentals required to go on to Intermediate German.

2-260. Intermediate German

Year, 3 credits each semester — Marianne Lederer

Italian

2-99. Basic Conversational Italian

Fall, non-credit — Magna E. Bauer and Giovanna Morville

Designed to impart facility in the use of practical, every-day Italian. Teaching adapted to ability and needs of individual students. The beginner can gain a minimal working vocabulary for a trip to Italy. The more advanced student can correct and improve his use of the language through conversation and reading. For beginners as well as students with one year of Italian.

[2-270.] Elementary Italian (1961–62 and alternate years)

Year, 3 credits each semester — Magna E. Bauer, Giovanna Morville

Designed to teach the student to understand, speak, read, and write the Italian language. Italian will be spoken from the beginning. This course serves as an introduction for beginners and a review for others.

Portuguese

2-290. Elementary Portuguese (1960–61 and alternate years)

Year, 3 credits each semester — Jacob Ornstein

Basic grammar and vocabulary. Reading, translation, and conversation. For beginners.

Russian

2-45. Review of Elementary Russian

Summer, non-credit — George M. Saharov

Review of Russian grammar and its application, with stress upon its relationship to English grammar, wherever possible.

2-292. Elementary Russian for Scientists

Year, 3 credits each semester — George M. Saharov

Provides essentials of Russian grammar in order to develop a reading knowledge of scientific Russian. The second semester is supplemented with reading of Russian texts on scientific subjects. Course is offered by special arrangement.

2-295. Elementary Russian

Year, 3 or 4 credits each semester — George M. Saharov, Eugenia Tarakus

Designed to give the student a sound foundation in basic Russian. Includes reading and writing. Special attention is given to the fundamental rules of Russian grammar, Russian phonetics, and the mechanics of good reading and writing. Students should have a good knowledge of English grammar.

2-296. Intermediate Russian

Year, 3 credits each semester — George M. Saharov

Reading and translation, grammatical analysis, dictation and conversation in Russian. *Prerequisite:* One year of Russian, which included the completion of a basic grammar text.

2-299. Advanced Russian

Year, 3 credits each semester — George M. Saharov

Reading and translation of more advanced Russian texts, composition in Russian, oral and written translation from English to Russian. Conversation. *Prerequisite:* Two years of Russian.

Spanish

2-78. Reading Scientific Spanish

Fall, non-credit — José Otero

Usage of recent and accepted scientific terms and of cognates of Greek and Latin origin. Readings will be based on selections from well-known scientific Spanish authors in the fields of agriculture, astronomy, atomic energy, botany, medicine, and zoology. The readings will be suited to the interests of students.

2-83. Basic Conversational Spanish

Fall, non-credit. Repeated in Spring and Summer — Odilón Ponce

Beginning with more essential phrases, the course encourages the use of simple sentences used daily. Through practice, the student learns to make himself understood and to follow conversations about the family, work, sports, meals, traveling, and other common subjects. With some outside study, the student should gain a basic vocabulary for conversation in Spanish. No previous knowledge of the language is required.

2-84. Conversational Spanish II

Fall, non-credit. Repeated in Spring and Summer — Odilón Ponce

A continuation of Basic Conversational Spanish. Increasing vocabulary and fluency will be attained through the reading of Spanish language magazines and newspapers. *Prerequisite:* Basic Conversational Spanish, or the equivalent.

2-90. Latin American Literature

Fall, non-credit. Repeated in Spring — Odilon Ponce

Acquaintance with main currents of Latin American literature through a brief outline of the history of the region and works of its outstanding authors. Readings from three authors representing different countries each semester. Round-table discussion. *Prerequisite:* Three years of college Spanish, or some fluency in reading and speaking Spanish.

2-300. Elementary Spanish

Year, 3 credits each semester — Erwin Jaffe, Marjorie C. Johnston

Foundation work in grammar, vocabulary, reading, and translation.

2-301. Intermediate Spanish

Year, 3 credits each semester — Marjorie C. Johnston, Jacob Ornstein

Grammar review, more difficult reading and translation, use of idioms, writing and discussion in the language. *Prerequisite:* One year of Spanish at college level, or two or three years below college level.

[2-302.] Spanish Composition and Conversation

Year, 2 credits each semester — G. Medrano de Supervia

Thorough training in the structure of the language, through reading and discussion of Spanish newspapers, magazines and novels of today. Writing of compositions, commercial, and familiar letters; helping student acquire ability to speak and understand everyday and colloquial Spanish. *Prerequisite:* Intermediate Spanish, or the equivalent.

Mathematics and Statistics

DEPARTMENTAL COMMITTEE

B. Ralph Stauber (Chairman)

Joseph F. Daly
Harold F. Dorn
W. Duane Evans
Margaret J. Hagood
Morris H. Hansen
Earl E. Houseman
Walt R. Simmons

The Statistician and His Education

Unprecedented dependence is being placed on statisticians by administrative officials in government and private business all over the world. The statistician, through his specialized training, is able to provide current and comprehensive information on many subjects, and to do so with speed and economy. His specialized techniques are indispensable in industry.

The making of a statistician is a long and exacting process—several years of graduate study, and at least a year and a half of high-grade experience under competent leadership. Educational facilities are strained, not only because of the heavy and increasing demand but also because the educational requirements placed on the statistician today are of an entirely different order of magnitude than they were a few years ago.

The courses described on the following pages accordingly provide training not only in theoretical principles, but training also in the administrative and research uses of data, as well as in the collection and processing of data and in the development and supervision of the minor skills necessary for carrying out statistical work.

In the design of a survey the statistician is concerned with the reliability and the cost of the figures that are to be obtained. Reliability is affected by many sources of error, which can be classified under two groups: (a) biases that are common to both complete counts and samples; (b) sampling errors. A thorough understanding of both types of error is essential in the work of the statistician. The statistical courses listed on the following pages deal mainly but not entirely with sampling errors. Proficiency in one or another branch of subject-matter such as sociology, economics, agricultural science, engineering, or some other specialized field, is essential for a full appreciation of the first type of error and for that reason collateral studies in one or more fields of science are advised and in fact are insisted upon in work leading to a Certified Statement of Accomplishment in Statistics.

COURSES LEADING TO CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN STATISTICS

(With Concentration in One of the Following Fields of Application)

BASIC COURSES—Required of all candidates

THE SOCIAL SCIENCES	THE NATURAL SCIENCES	MATHEMATICAL STATISTICS
College Algebra, Plane Trigonometry, and Analytic Geometry	College Algebra, Plane Trigonometry, and Analytic Geometry	College Algebra, Plane Trigonometry, and Analytic Geometry
Principles of Statistical Analysis	Principles of Statistical Analysis	Calculus
		Principles of Statistical Analysis

SPECIALIZED COURSES

3-206. Calculus	3-206. Calculus	3-400. Introduction to Mathematical Statistics
3-400. Introduction to Mathematical Statistics	3-400. Introduction to Mathematical Statistics	3-415. Higher Algebra
3-415. Higher Algebra	3-405. Introduction to Experimental Statistics	3-439. Sample Survey Procedures and Techniques
3-435. Sampling in Social and Economic Surveys	3-415. Higher Algebra	3-735. Theory of Sample Surveys
or	1-570. Design of Experiments in Biological Sciences	3-752. Advanced Theory of Probabality
3-735. Theory of Sample Surveys		3-571. Design, Philosophy, and Interpretation of Experiments
3-450. Introduction to Population Statistics		

ELECTIVE COURSES

3-502. Differential Equations
3-532. Introduction to Linear Programing
3-533. Introduction to Operations Research
3-540. Advanced Topics in Linear Programming
3-534. Special Problems in Operations Research
3-571. Design, Philosophy, and Interpretation of Experiments
3-752. Advanced Theory of Probability
3-587. Problem Analysis

Certified Statement of Accomplishment in Statistics

A Certified Statement of Accomplishment is offered in each of three fields of statistical study—fields representing areas of statistical preparation and application most useful in the public service. The required program in each field is outlined on page 36. The student who holds a bachelor's degree and who completes the basic courses and earns 24 credits in specialized courses listed in any column, with substitutions only as specifically approved, is eligible to receive a Certified Statement of Accomplishment. It certifies that the student has completed a program of study which, in conjunction with collateral training in a subject-matter field of application, prepares him for effective public service in a particular statistical field.

Mathematics

3-1. Review of College Freshman Mathematics

Year, non-credit — Harold F. Huddleston

A review course at the level of freshman mathematics. Algebra, trigonometry, analytic geometry. A brief introduction to the methods of the differential calculus. Emphasis on applications to statistical problems. *Prerequisite:* One year of college mathematics.

3-2. Review of Calculus

Spring, non-credit. Repeated in Summer — Joseph H. Kusner, William N. Ellis, Eugene B. Mitchell

Variables, functions, limits, divided differences, derivatives, application of derivatives to geometry, engineering curve fitting and analysis. Transcendental functions, polar equations, differentials, mean value theorem, techniques of integration and engineering application. Series and expansion of functions. *Prerequisite:* Calculus.

3-5. Review of College Algebra

Summer, non-credit — Wilbur L. Jobanek

A review course for persons who have completed a course in college algebra and now need a refresher course either for their work or so that they may go on to more advanced courses in mathematics.

3-6. Preparatory Mathematics for Introductory Statistics

Fall, non-credit. Repeated in Spring and Summer — Glenn W. Suter

A beginning course for students with inadequate mathematical background who desire to begin the study of statistics at the introductory level. The course will cover basic operations of algebra, fractions, exponents, summation notation, manipulation of algebraic expression, logarithms, graphic representation of equations, solution of simultaneous equations, elements of probability, permutations and combinations, and mathematical expectation. Emphasis throughout will be on the parts of algebra used in statistics. Examples and problems will be drawn primarily from statistical operations.

3-8. Elementary Algebra

Fall, non-credit. Repeated in Spring — James George

Addition, subtraction, multiplication, and division of algebraic quantities; exponents, involution, and evolution; surds; fractions; linear and quadratic equations and their graphic equivalents; complex numbers; ratio and proportion; binomial theorem; progressions and geometric series; logarithms.

3-102. College Algebra

Fall, 4 credits. Repeated in Spring — Wilbur L. Jobanek

The number system of algebra; algebraic expressions; elementary graphical methods; operations with polynomials; fractional expressions; linear equations; fractional exponents; radicals and complex numbers; quadratic equations; systems of equations in two unknowns involving quadratics; ratio, proportion, and variation; theory of equations; determinants; solution of equations by the inverse matrix; permutations, combinations, and probability; binomial theorem; progressions; infinite geometric series; inequalities; logarithms; mathematics of investment. *Prerequisite:* High school algebra and plane geometry.

3-103. Trigonometry and Analytic Geometry

Fall, 4 credits. Repeated in Spring — Joseph L. Stearn

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry.

Fundamental concepts and formulas; line, circle, parabola, ellipse, hyperbola; transformation of coordinates; polar coordinates; parametric equations; the second and higher degree equation in rectangular coordinates; graphic solution of equations; introduction to solid analytic geometry. *Prerequisite:* College algebra.

3-104. Trigonometry

Summer, 2 credits — Joseph L. Stearn

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry. *Prerequisite:* College algebra.

3-206. Calculus

Year, 4 credits each semester — Joseph H. Kusner, Eugene B. Mitchell

First semester: Variables, functions, limits, continuity, derivatives. Applications of the derivative to geometry and physics. Maxima and minima. Differentials. Mean value theorem. Simple integration and applications to geometry and physics. Radius and circle of curvature. Vectors.

Second semester: Standard integral forms. Special methods of integration. Approximate integration. Improper integrals. Indeterminate forms. Taylor's formula with remainder. Infinite series. Partial derivatives. Multiple integrals. *Prerequisites:* Algebra, trigonometry, and analytic geometry.

3-310. Introduction to Probability Theory

Year, 3 credits each semester — Jacob B. Chassan

To provide research workers with an introductory course in probability theory and its application to statistical technique. The course includes the historical development of various definitions and philosophic viewpoints of

probability, and their practical implications for subject matter application. Particular topics to be covered include combinatorial analysis, random variables and distribution functions, sums of random variables, the variance of a sum, discrete and continuous probability models, the testing of hypotheses and the estimation of parameters; topics of more recent interest will include the concepts of information, entropy, and the Uncertainty Principle, Markov matrices of transition probabilities, Monte Carlo methods, and waiting lines. *Prerequisite:* First-year calculus.

3-415. Higher Algebra (1960–61 and alternate years)

Year, 3 credits each semester — Randall D. Esten

Permutations and combinations, elementary probability, binomial and multinomial theorems. Theory of equations. Matrices, linear independence, orthogonality, partitioned matrices, and determinants; quadratic forms, linear transformations, latent roots of a matrix and characteristic function; numerical evaluation of determinants and solution of equations. *Prerequisite:* College algebra, trigonometry, and analytic geometry.

3-502. Differential Equations

Year, 2 credits each semester — William Malkin

The nature and origin of differential equations. Standard methods of solving ordinary differential equations with sample applications. Linear differential equations with constant coefficients, and applications to topics selected by students. Existence and uniqueness of solutions. Simultaneous equations and operational methods. Solutions by power series and the methods of Taylor, Picard, and Frobenius. Numerical solution. Partial differential equations and solution of boundary-value problems by Fourier series. Calculus will be reviewed as necessary. *Prerequisites:* Differential and integral calculus.

3-508. Theory of Errors

Fall, 3 credits — Joseph L. Stearn

Basic concepts in the theory of errors and their application to problems in engineering. The course is designed to give the student sufficient background to find solutions to problems in error theory and least squares. Classification of errors, the Gaussian law of error, measures of precision, propagation of errors, method of least squares as applied to observation and condition equations, design of significance tests for acceptance or rejection of observations, simultaneous solution of observation and condition equations, inverse matrix and alternatives to least squares. *Prerequisite:* Calculus.

3-509. Mathematics for Economists

Year, 3 credits each semester — Anthony S. Rojko

This course covers aspects of mathematics that are most useful to economists: algebra, geometry, differential and integral calculus, differential equations, and matrix algebra. At each stage, the mathematical methods described are used to solve problems based on economic theory or analysis. Part of the second semester is devoted to the use of matrix methods in fitting equations by least squares, in fitting systems of simultaneous equations, and in using such systems for analytical purposes. *Prerequisite:* A course in principles of economics.

3-440. Inventory Management Theory

Fall, 3 credits — George Y. Jordy

Policies for holding inventory of a single commodity when demand for the commodity is known (1) with certainty, (2) with uncertainty, that is as a random variable with a known probability distribution. Basic theory and derivation concomitant with computational and applied aspects are studied for several

fundamental decision rules. This approach is intended to give an understanding of the underlying concepts common to inventory decision rules so that general policies may be adapted to specific applications. Applications are emphasized.

Among the inventory policies considered are the Arrow, Harris, Marschak, "Optimal Inventory Policy," the S,s Policy, and the Tickler Decision Rule. Lead time is introduced into the analysis of the last two policies. Elements of probability theory, mathematics, and economics relevant to this topic are included. *Prerequisites:* Calculus and elementary statistics.

3-441. Advanced Inventory Management Theory

Spring, 3 credits — George Y. Jordy

The general theory of inventory holding and ordering policies. Existence theorems for optimal solutions are examined for cases of known and unknown distributions of demand. The problem of optimizing aggregate inventory is considered. A decision rule for obtaining the optimal aggregate inventory when related to production and employment is discussed and applied. Attention is also given to the problem of allocating aggregate inventory to optimal buffer stocks and lot sizes. *Prerequisites:* Inventory Management Theory, or the consent of the instructor.

3-532. Introduction to Linear Programming

Fall, 3 credits — Saul I. Gass

This course covers the basic theoretical, computational, and applied aspects of linear programming. It is designed to give the student the proper background to enable him to recognize when a problem has the makings of a linear programming problem, how to formulate such problems as linear programming models, and how to employ the proper computational techniques to solve these problems. It is designed to give the student proper understanding of the mathematical aspects that tie together these elements of linear programming.

The course includes the following topics: the general linear programming problem, the simplex computational procedure, the duality theorems of linear programming, the transportation problem, assignment problems, production scheduling problems, diet problems, additional applications, the relationship between the zero-sum two-person game and linear programming, parametric linear programming, and recent developments. Introductory lectures are given on matrices, vectors and vector spaces, convex sets, and linear inequalities. *Prerequisites:* The course is open to students majoring in mathematics and statistics, and to those majoring in the social or natural sciences upon approval by the instructor.

[3-540.] Advanced Topics in Linear Programming

(1961–62 and alternate years)

Spring, 3 credits — Saul I. Gass and Associates

The revised simplex method, dual simplex method, parametric programming, and other material pertaining to the computational techniques of linear programming. A number of applications and case studies from the current literature in linear programming and game theory are discussed. Students will be assigned papers to review in class. *Prerequisite:* Introduction to Linear Programming, or the consent of the instructor.

3-533. Introduction to Operations Research

Fall, 3 credits — Ralph A. Hafner

This course is designed to give the student perspective and technique for handling operational problems. Covers the basic mathematics useful in operations research, including probability and statistics, the optimum distribution of effort, queuing theory, game theory, the variational method, and information theory. Operations research projects are assigned. *Prerequisite:* College algebra and calculus; preferably also differential equations.

3-534. Special Problems in Operations Research

Spring, 3 credits — Ralph A. Hafner

Methods and techniques used in operations research, with emphasis on recent applications of interest. Lectures by specialists in the following: probability, statistics, and Monte Carlo methods, queuing theory, linear programming and game theory, computer applications and simulation, and new developments. *Prerequisites:* Calculus and statistics, or the consent of the instructors.

3-701. Introduction to Modern Mathematics

Spring, 3 credits — Jacob B. Chassan

A modern approach to the basic ideas of mathematics, with scientific applications. This approach begins with finite situations and logical relations as a basis for proceeding to a consideration of sets and subsets, probability, statistics, vectors and matrices, and game theory, with applications to biological and social scientific problems. *Prerequisite:* An undergraduate degree, or equivalent experience.

Statistics

3-126. Introductory Statistics

Year, 2 credits each semester. Repeated in Spring and Summer

C. M. Purves
Otto Rauchschwalbe
Quentin M. West
Jo Brice Wilmeth

The collection of data. The presentation of data in tables and charts. Different kinds of averages. Dispersion. Introduction to index numbers. Relations between two or more variables. Introduction to correlation theory, regression, and interpretation of samples. Practice in calculations. *Prerequisite:* High school algebra and geometry.

3-135. Elements of Statistical Drafting

Fall, 2 credits — Nelson P. Guidry

A practical course in drafting involving actual preparation of statistical maps and charts in class. Explanations of short cut methods of lettering technique and arrangement of component parts of illustrations. Complete illustrations will be prepared in ink ready for publication. The reduction, reproduction, and color application to statistical maps and charts will be explained. Students supply their own drafting tools.

3-136. Graphic Methods of Presenting Statistics

Spring, 2 credits — Nelson P. Guidry

Analysis of statistical data to determine what form is best for graphic presentation. Application of data to the many types of illustrations in several forms of the various classes. Rough pencil layout examples of time series charts, frequency diagrams, graphic correlation charts, pictorial symbol charts, cartograms and other illustrative examples will be prepared in class. Comparability and evaluation of individual charts and maps in a series will be analyzed.

3-318. Machine Tabulation I

Fall, 2 credits. Repeated in Spring — Milton Kaufman

Designed principally for statisticians, accountants, and operators of punch card tabulating equipment. The instruction covers the principles of operation,

functions, applications, limitations, etc. of the various types of IBM equipment such as card punching and verifying machines (including types 24 and 26), sorters, alphabetic accounting machine (type 402), reproducing punches, and other auxiliary machines. *The course covers instruction in the basic wiring of the machines.* More than half the course is spent on the alphabetic accounting machine (type 402). Instruction also deals with the principal Remington Rand punch card tabulating equipment. The course is not intended to train personnel in the physical operation of the various machines.

3-319. Machine Tabulation II

Fall, 2 credits. Repeated in Spring — MILTON KAUFMAN

Designed principally for statisticians, accountants, operators, and supervisors of punch card tabulating equipment. The instruction covers the principles of operation and functions of the IBM accounting machines, type 407 and the collating machines, types 77 and 89. *The course covers instruction in the wiring of the machines including the solution of advanced wiring problems. Prerequisite:* Machine Tabulation I, or knowledge of the basic wiring of tabulating equipment.

[3-320.] Introduction to Acceptance Sampling (1961–62 and alternate years)

Fall, 2 credits — EARL E. HOUSEMAN and RICHARD P. BARTLETT, JR.

A course in the planning, developing, and use of variables and attribute acceptance sampling plans. The instruction includes discussion of the role of the administrator and technician (other than the statistician) in planning, developing, and using sampling plans. Elementary probability; the binomial, Poisson, and normal distributions; sampling error; and tests of significance are discussed. Applications of statistical techniques are concerned mainly with those that can be easily used by non-statisticians. *Prerequisite:* A working knowledge of algebra; an elementary course in statistics is desirable.

3-380. Principles of Statistical Analysis

Year, 3 credits each semester — B. RALPH STAUBER

The purpose of the course is to lay a thorough foundation of the basic concepts and principles of statistical analysis, and to develop in the student an understanding of their application to scientific investigation. The course includes elementary probability; the binomial, Poisson, and normal distributions; introduction to sampling; statistical tests of significance; simple and multiple correlation; some theory of determinants with applications to correlation and the inverse matrix; introduction to analysis of variance and covariance; elementary principles of design and analysis of surveys and experiments; use of statistical tables by Fisher, Yates, and others. *Prerequisite:* A working knowledge of algebra, trigonometry, and analytic geometry; an elementary course in statistics is desirable.

3-385. Elements of Statistical Methods

Year, 2 credits each semester — WALTER R. HARVEY

A comprehensive study of the principles underlying statistical methods with particular reference to the natural and physical sciences; elementary probability, distribution of discontinuous and continuous variables, statistics versus parameters, the chi-square test, the "*t*" test, correlation, regression, analysis of variance and covariance, and the meaning of experimental error and statistical inference. This class meets at the Agricultural Research Center, Beltsville, Maryland. *Prerequisite:* College training in agriculture or a biological science. A college course in algebra will be helpful but is not essential.

3-400. Introduction to Mathematical Statistics (1960–61 and alternate years)

Year, 4 credits each semester — GARRIE J. LOSEE

A foundation course. A broad introduction to modern mathematical statistics, as preparation for further work in mathematical statistics for an advanced degree, or for a certified statement of accomplishment. In the first semester, the theory underlying mathematical statistics is developed. Included are the fundamental definitions and axioms of mathematical probability, discrete and continuous distributions, and expected values and moments of distributions. The latter part of the semester is devoted to statistical inference, including sampling distributions, point and interval estimation, and tests of hypothesis. The second semester treats regression theory, experimental designs and analysis of variance, and methods of solution when the underlying distribution is unknown. *Prerequisites:* Calculus and one year of statistics.

3-405. Introduction to Experimental Statistics

Year, 2 credits each semester — HAROLD F. HUDDLESTON

A non-mathematical course in the analysis and interpretation of experimental data. Elementary probability relationships, binomial, Poisson, and normal frequency distributions; the concept of sampling error; tests of significance of differences between averages; the chi-square test as applied to differences between observed and expected frequencies; regression and correlation; and elementary discussions of analysis of variance and covariance. The basic design principles of completely randomized experiments, randomized blocks, Latin square, split plot, incomplete blocks, lattices, factorials, and confounding are discussed. Numerical examples. *Prerequisites:* College training in agriculture or a biological science; familiarity with ordinary methods of tabulating experimental data, computation of averages, and the preparation of graphs.

3-435. Sampling in Social and Economic Surveys (1960–61 and alternate years)

Fall, 3 credits — HAROLD NISSELSON

Non-mathematical survey of sampling theory and practice. Development of the basic ideas of statistical sampling, with applications in social and economic surveys. Unrestricted random, stratified, systematic, area and cluster sampling, and subsampling. Sample designs used in the United States and in foreign countries are discussed with respect to considerations of statistical efficiency, cost functions, and the administrative limitations imposed on the design. *Prerequisite:* A course in elementary statistics.

3-450. Introduction to Population Statistics

Fall, 3 credits — JACOB S. SIEGEL

Principal sources of population data. Collection and processing of demographic data. Problems of census taking. Measuring the quality of population data. Basic methods of measuring and analyzing population size, geographic distribution, composition (age, sex, race, and ethnic composition) and dynamics (natality, mortality, reproductivity, and migration). Principal demographic rates, including crude and adjusted rates. General methods such as standardization, cohort analysis, and interpolation. Nature and use of life tables. Population estimates and projections. *Prerequisites:* An elementary course in statistics and one or more courses in the social sciences.

3-480. Statistical Methods and Experimental Design

Spring, 12 credits — JAMES G. OSBORNE and AUSTIN A. HASEL

Application of statistical methods to research work in the Forest Service, stressing the logic of experimentation and the techniques of design, analysis, and

interpretation of experiments or surveys. Emphasis is placed on: testing hypotheses in forest research; distribution of sample statistics; tests of significance.

Registration limited to qualified research personnel of the Forest Service.

3-520. Government Statistics

Fall, 2 credits — Morris B. Ullman

Designed to give a general view of the wealth of statistical data available from Federal agencies. For various broad subjects covered by Federal surveys, the principal sources, concepts used, limitations inherent in the data, and methods of presentation will be discussed. *Prerequisite:* An elementary course in statistics.

3-564. Scientific and Business Data Processing on Electronic Computers—UNIVAC 1103A and 1105

Year, 3 credits each semester — Charles P. Covington

First semester: Designed to acquaint the student with computer terminology and basic computer concepts. The second eight weeks are devoted to the principles and practices required in employing a large scale digital computer for scientific, statistical, and business data processing. Lectures include basic components of a computing system, binary and octal number system, program control, subroutines, flow charting, problem analysis, input-output methods, and program testing. The two address logic of UNIVAC 1103A system is cited as prototype. Tour of an installation. *Prerequisites:* Mathematical maturity; experience in problem analysis.

Second semester: Advanced programming operations; automatic programming; input-output registers, bi-directional buffers for input and output; operating the computer; data processing problems. UNIVAC 1105 is cited as a prototype. Tour of installation. *Prerequisite:* First semester, or special permission.

3-565. Data Processing on Electronic Computers—UNIVAC II

Year, 2 credits each semester — Charles R. Shimkus

First semester: This course is designed to introduce the student to the basic principles and practices required in applying large scale data automation systems to business and statistical-type problems. Lectures include basic fundamentals of computer design and operation; introduction to flow charting and problem analyses; computer instruction coding; basic programming techniques; the binary XS-3 alpha-numerical code; magnetic tape input and output through buffers, auxiliary devices. The single address logic of the UNIVAC II system is cited as the prototype. *Prerequisite:* Accounting, mathematics, algebra, or experience in problem analysis.

Second semester: Advanced programming techniques; sorting on magnetic tapes; program testing; air recovery; service and operational routines; data designs and English language automatic programming; sorting and mathematical generators. Tour of an installation. *Prerequisite:* First semester, or the consent of the instructor.

3-566. Data Processing on Electronic Computers—UNIVAC File Computer

Year, 2 credits each semester — Charles R. Shimkus

First semester: Introduction to the basic fundamentals of designing and programming solutions for an asynchronous digital computing system. Lectures include preparation of flow chart; three address instruction coding; basic programming techniques; buffering and time sharing; multiple on-line input-output devices; problems in file maintenance; statistics and reporting. The UNIVAC File Computer is cited as the prototype. *Prerequisite:* Punch card accounting, or experience in problem analysis.

Second semester: Handling problems of a more complex nature; format control of input and output records; programming 80 and 90 column card; magnetic tape and punch paper tape input-output devices; air recovery; program testing; minimum latency coding; service and operational routines. Tour of an installation. *Prerequisite:* First semester, or the consent of the instructor.

3-567. Data Processing on Medium-Sized Electronic Computers—IBM 650

Year, 2 credits each semester — John F. Mann, Jr.; M. H. Schwartz

The first semester provides general background and a basic understanding of the capacity and capabilities of medium-sized, medium-speed electronic data processing machines. The IBM 650 is used as an example of machines of this type. The topics treated are: Types of computing equipment; range of commands executed by machines; format of instructions; preparation of flow charts; writing of detailed machine instructions; instruction modification; and uses of supporting and auxiliary equipment.

The second semester will include detailed consideration of the preparation and use of programs for medium-sized computers. Emphasis is upon the organization of data and material for machine processing; card and input formats; output format; coding of material for machine processing; preparation of program test materials; program testing; optimum programming; symbolic programming; and service routines.

Those taking the course should have experience in accounting, statistical data processing, or systems analysis.

3-580. Data Processing on Medium-Sized Advanced Electronic Computers—IBM 7070

One year, three credits each semester — John F. Mann, Jr.; M. H. Schwartz

The first semester introduces concepts of a high-speed digital-stored program computer utilizing advanced technology. The basic arithmetic, logical operations, and an introduction to indexing are covered. A basic assembly system, Autocoder basic, is included. Basic programming techniques, flow charting, and problem analysis are covered. Sample problems are presented.

The second semester includes more detailed discussion of the material covered in the first semester. The use of magnetic tape as input/output media for a tape-oriented 7070 is emphasized. Automatic priority processing, the interrupt features, zero elimination, and scatter gather are examined. Emphasis is on the new concepts involved in using these advanced input/output systems. Additional programming languages and systems are surveyed. *Prerequisites:* Experience in accounting or statistical data processing. Training in other stored programmed computers desirable.

3-760. Programming Techniques for a General Purpose Electronic Digital Computer—Scientific Applications

Year, 3 credits each semester — Paul L. Chessin

Beginning with basic ideas, the course aims at the complete programming system, with emphasis on scientific applications. The IBM 709 Electronic Digital Computer is used as the prototype for programming for a single address, general purpose, stored program, digital information processor. Where applicable, the IBM 704 and IBM 7090 features are pointed out.

The first semester includes the following topics: what computers do; what computers are; basic components of a general computer; machine logic necessary for programming; flow diagramming; flow of control; binary and octal number

systems; conversions between number systems; instruction and simple coding techniques; simple machine decisions; macro-operations; input-output.

The second semester includes: looping and non-looping techniques; address modification; indexing and counting; open and closed subroutines; testing (debugging) procedures; interpretive and compilative systems; production-run techniques. Special emphasis is placed on the SHARE Operating System (SOS) and FORTRAN System. Tours of a computer installation and preparation of a program for SHARE distribution. Discussions and analyses of simple SHARE routines. *Prerequisite:* Students should have sufficient mathematical maturity to utilize mathematical symbolism at the level of number systems, matrix inversion, and infinite series.

1-570. Design of Experiments in the Biological Sciences

(*See* p. 16)

3-439. Sample Survey Procedures and Techniques

Fall, 2 credits — Garrie J. Losee

A non-mathematical introductory course in sampling with emphasis on the procedures and techniques used in conducting a sample survey. This course has two objectives: to acquaint potential users of sample surveys with the limitations, as well as the value, of surveys; and to instruct both administrators and developing technicians in the methodology employed in the field of sampling. The steps essential to all sampling operations are developed, including specifically the drawing of specifications, designing the sample, selecting the sample, collecting data, estimating, and measuring the reliability of estimates.

3-735. Theory of Sample Surveys

Year, 2 credits each semester — Joseph Steinberg

History of sampling in social surveys. The use of statistical control in improving the quality and efficiency of the estimates. Calculation of sampling errors. Random, stratified random, purposive, double and systematic sampling. Cost function, choice of sampling unit; size and type of sample necessary to attain a stated degree of precision, and the distinction between precision and accuracy. The theory of probability is developed as necessary. The contributions of Fisher, Neyman, Yates, Cochran, and others are studied. *Prerequisite:* Principles of Statistical Analysis and Calculus.

[3-736.] Non-sampling Errors in Statistical Surveys (1961–62 and alternate years)

Fall, 2 credits — Morris H. Hansen, William N. Hurwitz, and Associates

Identification, measurement, and control of errors in the reporting and processing of statistical data. Elementary mathematical models of non-sampling errors; identification and measurement of the components of response variance and response bias. Identification of sources and components of non-sampling errors. Application to optimum design of survey procedure. *Prerequisites:* Introduction to Mathematical Statistics, Theory of Sample Surveys, or the equivalent, or professional experience involving technical work in sampling or analysis of variance.

3-025. The Organization of Statistical Services within the Federal Government—Seminar

Fall, non-credit — Walter F. Ryan

The Federal statistical system: its growth, organization, major characteristics, and functions. A series of four lecture-seminars meeting from 3:30 to 5:00 P.M. on September 28, October 12, October 26, and November 9. Registration is required, but no fees are charged.

Office Techniques and Operations

DEPARTMENTAL COMMITTEE

HENRY A. DONOVAN (Chairman)

SHIRLEY BARLOW	TERRY J. MCADAMS (Vice-chairman)
ROBERT H. FUCHS	MAX P. REID
KELSEY B. GARDNER	EDMUND STEPHENS
MARK M. KIRKHAM	WILLIAM T. WOLFREY

The courses offered in this department are practical, how-to-do-it courses of interest chiefly to persons who are working with these procedures, or who hope to train themselves for such positions. They are helpful also to persons in positions requiring some familiarity with more than one of the procedures (e.g., supervisors and administrative assistants), and to persons at the higher levels of responsibility who wish to become acquainted with the details of the operations.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ADMINISTRATIVE PROCEDURES

The program leading to a Certified Statement of Accomplishment in Administrative Procedures should be of special interest to:

1. Persons already employed in administrative work of the procedural type, emphasizing techniques and skills.
2. Employees who aspire to enter administrative work.
3. Employees who wish to prepare to become administrative assistants or to head units concerned with administrative procedures.

Requirements

1. High school diploma or equivalent.
2. Sixteen semester hours of credit with grades of "C" or better in Graduate School courses, distributed as follows:
   a. A course in American National Government.
   b. A minimum of eight credits (in addition to *a* above) selected from courses above the 100 level in the Department of Office Techniques and Operations or the Department of Public Administration, or a combination of these. Courses in accounting may not be included, except Federal Fiscal Procedure and Federal Government Accounting.
   c. The remaining credits may be selected from courses, not included above, in the Department of Office Techniques and Operations, excluding all shorthand courses.

d. A course in elementary statistics may be included. It is not required. If it is included, three credits may be deducted from *c* above.

e. A course in data processing may also be included.

—o—

Administrative Procedures

4-35. Paper Management Workshop

Fall, non-credit. Repeated in Spring and Summer

William S. Harris, Artel Ricks, and Associates

Plain Letters: Modern letter writing techniques taught by the 4-S Formula; for letter writers. *Forms Improvement:* Techniques of form analysis and forms design are taught to achieve forms simplification; for officials, supervisors, and line and staff specialists. *Form and Guide Letters:* Instructs in the most efficient way to identify, develop, and use form and guide letters; for those responsible for analyzing and managing volume correspondence operations. *Correspondence and Mail Operations:* Tested methods of expediting correspondence and simplifying mail operations in agencies, including offices of officials; for operating officials and supervisors. *Records Disposition:* Techniques to move records out of high cost office space and filing equipment, and to identify permanently valuable files; for supervisors and persons in charge of files in large or small offices.

4-88. Gregg Notehand

Fall, non-credit. Repeated in Spring — Kathrine Wilkey Gaasterland

Personal-use shorthand with integrated instruction in making notes. A course in note making—not vocational shorthand—implemented by a short writing system based on the alphabet of Gregg Shorthand. The aim is to assist administrative assistants, doctors, executives, lawyers, students, teachers, writers, and others to read and listen more intelligently and to make notes discriminately for future study and other uses. No dictation or words-a-minute objectives.

4-95. Office Aids and Basic Office Practices

Fall, non-credit — Shirley Barlow

Designed to aid in developing skills for improvement and preparation for advancement. Recommended for Federal employees through GS-5.

4-101. Everyday Mathematics

Fall, 2 credits. Repeated in Spring and Summer — Ralph R. Botts, C. M. Mouser

Designed for clerical workers who are called upon to apply fundamentals of arithmetic to their jobs. Emphasis is placed on review of business arithmetic, including fractions, decimals, ratios, and percentages. Special applications are made to civil service and business problems such as bank, cash, and trade discount, profit and loss, payrolls, simple and compound interest, fire insurance, stocks and bonds, property and income taxes, and the determination of interest rates charged on time purchases and small loans.

3-8. Elementary Algebra (*See p.* 38)

4-108. Administrative Procedure

Fall, 2 credits. Repeated in Spring and Summer — Thomas J. Hickey

Intended for persons who wish to become supervisors or administrative assistants or who are now serving in such capacity in a small organizational unit.

Deals with the aspects of the day to day assignments for which these persons ordinarily are responsible, such as preparation of budget data for small organizational units; the proper establishment of authority and responsibility and organization structure; fundamentals of personnel administration; essential requirements for good supervision.

The second part of this course deals with the introduction to administrative planning, administrative procedures and management generally at the lowest organization level, including work reporting and work measurements, work processes and work control reports; relation of these studies to the budgetary and personnel needs of the unit; and the theory of staff versus operating jurisdiction over administrative planning.

4-201. Supervision

Fall, 2 credits. Repeated in Spring WILLIAM R. VAN DERSAL and ASSOCIATES

A course primarily for persons who are, or who have been supervisors. In addition to a study of the basic principles of supervision and of staff operation, the course deals with supervisory methods, such as training, work load determination, planning, organizing, scheduling, inspection, communications, conference leadership, and related items.

4-206. Essentials of Good Office Management

Fall, 3 credits. Repeated in Spring GLENN D. WAGNER

Designed to give a better understanding of the principles and techniques of effective management and of the practical applications that can be made of these to one's work. Includes a review of current research and thinking in this field and a comparison of practices in government and industry. Covers such problems and questions relating to office management as (1) organizing for effective operations; (2) the planning and control of work; (3) utilization of office equipment and services; (4) paperwork management; (5) human relations problems; (6) getting coordinated effort and team work; and (7) effecting improvements.

4-112. Federal Fiscal Procedure

Year, 2 credits each semester LOUISE M. KRUEGER

Intended to provide comprehensive understanding of basic fiscal and accounting laws, rules and regulations of the Government and their application to specific fiscal activities. Relationship of executive departments with the staff agencies, the basic fiscal procedural sources. Covers in detail each type of fiscal operation, including use and processing of accounting and fiscal forms, disbursements and collections, and related records and reporting. The first half of the course considers the general background of laws and regulations; symbolization of accounts; processing of payrolls; the handling of leave, retirement, tax, and bonds, and the administrative examination of travel and transportation payments. The second half deals with a continuation of a study of basic laws, rules and regulations covering fiscal and accounting activities, with emphasis on procedures involving disbursements for supplies, equipment, utilities, and other items, use of imprest funds and agent cashiers; handling of billings, collections and deposits; effecting adjustments for errors; handling claims and uncollectible debts; and the responsibilities of certifying officers.

4-113. Federal Property Procedure

Spring, 2 credits TONY M. BALDAUF
V. SAMUEL GUNTHER

An intensive one-semester course covering laws, regulations, and principles dealing with control, utilization, and disposal of Federal personal property. De-

signed to furnish persons currently employed in this field an opportunity to study approved accountability and control systems, including management techniques, capitalization policies, general ledger controls, audit and inspection requirements, inventory controls, and accountability methods; utilization policies and procedures, including development and application of use, replacement, and preventive maintenance standards; management through inventory controls, surveys, and inspections; disposal policies and procedures, including transfers, donations, sales, abandonment, and destruction; statistical reporting of motor vehicles.

4-114. Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring and Summer — Henry C. Starns

Deals with the elementary principles and procedures of Federal personnel administration, including a study of the Federal personnel structure and organization, rules and regulations of the Civil Service Commission, and other basic procedural sources; use of personnel forms and records; Civil Service examinations and recruitment; appointments; transfers; promotions; separations and reductions in force; suspensions and disciplinary actions; retirement; performance ratings; leave and hours of duty; administrative policy statements, and administrative orders.

4-115. Federal Purchasing Procedure

Fall, 2 credits — Tony M. Baldauf, V. Samuel Gunther

For persons who are in purchasing work or who wish to enter the field. Covers the historical and legal background of Federal purchasing, professional concepts in purchasing, current legal requirements, purchasing procedures from open market and Federal sources of supply, and purchasing techniques; the practical application of such requirements through the preparation of purchase documents; the study of case problems involving legal or administrative restrictions or requiring the application of purchasing principles.

4-116. Federal Budgetary Procedure: Budget Formulation and Presentation

Fall, 2 credits — William A. Carlson

This course is designed for persons in budget work, up to and including Grade GS-9, those interested in entering budget work, or others in related fields who are interested in learning more about the development phase of budget procedure. Students who are not in budget work will find it useful to have a general, although not necessarily a specialized, familiarity with the concepts and terminology used in either fiscal, accounting, personnel, or other financial operations of the Federal Government. The course covers the basic legal and institutional framework, procedures, and practices involved in the preparation of budget estimates, justifications, and supplementary materials. Emphasis is placed on budget procedures at the bureau or small agency level. The class work includes the preparation of a budget estimate for a hypothetical government agency.

4-118. Federal Budgetary Procedure: Budget Execution and Fund Control

Spring, 2 credits — John W. Walker

This course is designed for persons in budget work, up to and including Grade GS-9, those interested in entering budget work, or others in related fields who are interested in learning more about the performance phase of budget procedure. The course covers systems of administrative control under the Antideficiency Act, allotments, apportionments, review of progress in relation to financial plans, related reports, and other aspects of budgetary control over appropriations and funds. The course work includes problems and discussion

illustrating various steps of the budget execution process at the bureau or small agency level and a review of the basic laws, regulations, concepts, and terminology involved.

4-117. Records Management Procedure

Fall, 2 credits — Dorothy M. Luttrell and Robert H. Lando

A course of instruction in how to process, maintain and service records, designed for students who desire to enter the records management field or who are interested in supplementing their knowledge of the mechanics and techniques of record operations. Includes detailed instructions in methods of (1) recording and controlling communications; (2) classifying, coding, and indexing correspondence and other record material; (3) filing records and references, and (4) furnishing records reference service, including the establishment and operation of charge-out and follow-up systems. This course also provides study and discussion of (1) the theory and structure of the various systems of classification and filing; (2) the selection of the proper systems of classification for individual requirements; and (3) the development of individual classification and filing patterns.

4-217. Advanced Records Management

Spring, 2 credits — Dorothy M. Luttrell and Robert H. Lando

An advanced course designed to give students a comprehensive knowledge of the management of Government records. The study of Federal laws and regulations governing the creation, maintenance, protection, preservation, and disposition of records and action necessary for meeting these statutory and regulatory requirements including: (1) records management program activities; (2) planning and conducting records management surveys; (3) inventorying and evaluating records; (4) analyzing records management problems and formulating solutions to such problems by the application of management techniques to the organization and maintenance of current records and the disposition of noncurrent records; (5) the development and application of records retention and disposal standards; and (6) the appraisal, retirement, storage, microfilming, and disposal of records. *Prerequisite:* Records Management Procedure, or the consent of the instructors.

6-412. Reports and Forms Management (*See* p. 70)

4-330. Government Letter Writing

Fall, 2 credits. Repeated in Spring and Summer — Lucile N. Boyd, Joy Cutler

Intended for persons in administrative positions who are called upon to handle administrative problems through correspondence. The writing of clear, accurate, concise, courteous letters and memoranda. Principles of effective letter writing. Practice in criticizing and revising outgoing correspondence, and in planning and drafting replies to incoming letters. *Prerequisite:* A good foundation in English grammar, vocabulary, and composition, through courses or writing experience.

4-421. Writing Procedures and Instructions

Spring, 2 credits — Frederic C. Osgood

Study and practice of principles and techniques applicable to the writing of formal procedures and instructions, especially for codified manuals. The course includes (1) discussion of expository writing, format, style, and use of illustrations, and (2) development of an outline for, and preparation, review, and revision of an actual instruction. Designed to increase competence in instructional writing. *Prerequisite:* Management of Directives, or experience at GS-5 or above in the composition of written instructions.

Certified Professional Secretary

Students who plan to take the Certified Professional Secretary (CPS) Examination will find the following courses helpful: Business Law, English for Secretaries—Rapid Review, Everyday Mathematics, Human Relations in Administration, Office Aids and Basic Office Practices, Practical English Usage, Principles of Economics, and Supervision.

Shorthand

The courses in shorthand at the Graduate School are designed to offer Federal employees a program of training for stenographic careers in the Federal service. Each course represents a separate unit of study, in which emphasis is placed on materials similar to those used in the Federal Government. The sequence of courses presents a sound foundation to qualify for the various grades of stenographers in the Federal service.

Review of Gregg Shorthand (Anniversary) serves as a rapid review course for the student who has not used his shorthand recently, or who needs additional practice in office dictation. The student who wishes to review Simplified Gregg should enroll in *Gregg Shorthand Simplified, 60–80 Words.*

In order to reach the goals stated in the course descriptions, home study is essential. The amount of study varies with the learning ability and requirements of the individual student.

The ability to type with a fair degree of accuracy and speed is a prerequisite for all shorthand courses.

4-89. Review of Gregg Shorthand (Anniversary), 60–90 Words

Fall, non-credit. Repeated in Spring and Summer

Frances A. Butler
Helen Dressel
Harriet E. Stern

A review of theory and brief forms. Reading from shorthand plates and students' own notes; dictation of standard material at various progressive rates of speed. *Prerequisite:* Completion of the Gregg Manual or its equivalent by the Anniversary system. Shorthand writers who have completed Gregg simplified theory may also register in order to acquire shortened forms for higher speed dictation.

4-129. Gregg Shorthand Simplified I

Fall, 3 credits. Repeated in Spring and Summer

E. Donald Bell
Wilhelmina M. Cerine
Helen Dressel
Kathrine Wilkey Gaasterland
Harriet E. Stern
Vincent B. Vallieres

Covers the theory of Gregg Shorthand Simplified. Beginning dictation on new and familiar material.

4-130. Gregg Shorthand Simplified II

Fall, 3 credits. Repeated in Spring and Summer

E. Donald Bell
Wilhelmina M. Cerine
Helen Dressel
Kathrine Wilkey Gaasterland
Harriet E. Stern
Vincent B. Vallieres

Increasing mastery of principles of Gregg Shorthand Simplified, by review and drill. Minimum dictation speed of 60 words a minute attained, with accurate transcripts, on new standard material. *Prerequisite:* Gregg Shorthand I or equivalent.

4-225. Gregg Shorthand Simplified, 60–80 Words

Fall, 3 credits. Repeated in Spring and Summer

E. Donald Bell
Wilhelmina M. Cerine
Vincent B. Vallieres

Theory review: brief forms; word beginnings and word endings; preliminary phrasing. Extensive dictation practice, using general business and governmental material. In-class and outside transcription. Sample Civil Service test material. Maximum dictation speed of 80 words a minute attained. *Prerequisite:* Shorthand I and II or equivalent theory and dictation courses, and a minimum speed of 60 words a minute on new, standard material.

4-226. Gregg Shorthand, 80–100 Words

Fall, 3 credits. Repeated in Spring

Nora M. Walker

For those who have a minimum dictation speed of 80 words a minute using either the Simplified or Anniversary system, and who are able to produce accurate transcripts of letters and reports. Students who are weak on theory should take either 4-89 or 4-225 before enrolling in this course.

Physical Sciences

DEPARTMENTAL COMMITTEE

HENRY STEVENS (Chairman)

WILLIAM E. BENSON
MILDRED C. BENTON
ROBERT L. BOWMAN
ALBERT V. CARLIN
BOWEN C. DEES
ALLEN O. GAMBLE
JOSEPH HILSENRATH
JOHN LYMAN (Vice-chairman)
PAUL W. MCDANIEL
VIRGINIA L. ZARATZIAN

—o—

The courses in this department offer unusual opportunities for study under the guidance of scientists working in this field. The program will be of value to students who plan to enter these sciences; to those who desire to increase their knowledge of the science in which they now earn their living; and to those who wish, for cultural reasons, to learn more about these fields.

Most of the courses in this department are seminars designed to keep professional workers informed of recent developments in their fields and do not include laboratory work. A few of the courses offer basic training and, as stated in the course descriptions, include laboratory work.

In addition to the courses listed below, the Graduate School offers courses in the physical sciences at the National Institutes of Health in Bethesda, Maryland. These courses are listed on pages 110–19 of this catalog.

—o—

GENERAL

5-175. Descriptive Astronomy

Fall, 2 credits — ARMSTRONG THOMAS

Designed primarily to give the layman and amateur astronomer a better understanding of the heavens about us. It deals in a non-technical manner with a description of our solar system, including the planets, their satellites, and meteors; stars in our galaxy; and systems beyond our galaxy. The nature of some of the fundamental laws and forces at work in our universe are considered, including possible orbits into outer space.

5-225. The Principles of Physical Science

Year, 2 credits each semester — MICHAEL J. PALLANSCH

A survey course designed for persons who work with scientific material but who may not have scientific training. It is of particular interest to librarians, information specialists, editors, research assistants, and others who have a general interest in current developments in the physical sciences. The fundamental concepts held in common in the fields of physics, chemistry, medicine, and cos-

mology are studied in relation to the recent developments in atomic power, space travel, synthetic fibers, antibiotics, human nutrition, and other subjects of current interest.

Although it is recommended that the two semesters be taken in sequence, each semester is taught as an independent unit, and students may enter the second semester without the first. In general, the topics in the first semester will be taken from the field of physics, and in the second semester from the field of chemistry.

5-230. Science and the Modern World

Spring, 2 credits — Fred Schulman

A non-technical descriptive course for the non-specialist, interpreting recent advances in science. The subjects include nuclear physics, cancer, atomic energy, missiles, and space vehicles, selected subjects in chemical and medical research, and other topics. Emphasis will be placed on provocative new concepts and their impact on today's complex society.

5-438. Space Science and Technology

Fall, 2 credits — Douglas L. Worf

Beginning with a description of the environment of space, this course will review the over-all state of today's space technology, considering vehicles, power plants, fuels, materials, guidance, control, and tracking. Problems of atmospheric reentry and manned space flight will be discussed. Scientific and military applications of astronautics will be covered, including their political, legal, and sociological implications. The course will end with an analysis of development trends and consideration of the probable shape of astronautic things to come. *Prerequisite:* A bachelor's degree, or the equivalent. Some calculus and an understanding of basic physics.

Chemistry

5-315. Elementary Biochemistry

Year, 2 credits each semester — Sidney M. Hess

A comprehensive survey of the chemistry of body constituents and metabolic conversion. The first semester covers the chemistry of carbohydrates, fats, proteins, and the fundamentals of enzyme chemistry. The second semester deals with digestion and absorption of food, intermediary metabolism, and the physiological role of vitamins and hormones. *Prerequisite:* Organic chemistry.

[5-349.] Physical Chemistry (1961–62 and alternate years)

Year, 2 credits each semester — William Horwitz

Lecture course on the states of matter—gases, liquids, and solids; elementary thermodynamics, solutions, homogeneous and heterogeneous equilibria including the phase rule; ionic equilibria, conductance, electromotive force; chemical kinetics and colloids. *Prerequisite:* General chemistry, qualitative and quantitative analysis, physics, and calculus, or permission of the instructor.

Geography and Geology

Students who are studying or working in the field of geography or geology may be interested, in addition to the courses listed here, in courses in Soil Sciences, Meteorology, and Surveying and Mapping.

[5-114.] Maps and Charts (1961–62 and alternate years)

Fall, 2 credits — Catherine I. Bahn

An introductory course designed to give the analyst, researcher, librarian, or teacher who works with maps an understanding of both domestic and foreign maps and charts, the agencies that produce them, and their catalogs and indexes. Presents methods in reading and problems in interpreting foreign maps. United States, foreign, and international mapping activities are studied on a workshop basis to permit presentation and solution of individual problems. All types of maps, charts, aids, and reference materials are available for laboratory use.

5-203. General Geology

Fall, 3 credits — Raymond C. Douglass

Minerals and rocks as constituents of the earth's crust; processes of weathering, erosion and deposition; vulcanism; structures of sedimentary and igneous rock formations; diastrophism; mountain building; land forms and their relation to various geologic processes; stability of the earth's crust. The course includes classroom exercises in the study of common minerals and rocks, and interpretation of topographic and geologic maps. *Prerequisite:* Inorganic chemistry is desirable.

5-204. Historical Geology

Spring, 3 credits — Raymond C. Douglass

Study of the development of the earth through time, the growth and destruction of mountains, the origin of the sedimentary formations, and the development of plants and animals from the first meager evidences of life to the present. Field and laboratory study of rocks and fossils of representative geologic ages exposed in the greater Washington area. *Prerequisite:* General Geology, or an acquaintance with the principles and processes of physical geology.

8-208. Aerial Photographic Interpretation (*See* p. 100)

8-408. Advanced Aerial Photographic Interpretation (*See* p. 100)

[5-533.] Hydrology (1961–62 and alternate years)

Year, 3 credits each semester — Tor Nordenson

A two-semester course in basic and applied hydrology at the professional level. The first semester will be largely descriptive, covering such topics as elementary hydraulics; measurement and interpretation of streamflow, precipitation and other basic data; the hydrologic cycle; physics of soil moisture; the infiltration theory; wave travel and the unit hydrograph. The second semester will cover the development and application of procedures for applying basic hydrology to practical problems of river forecasting and design of water control works including such subjects as streamflow routing, flood frequency, the rational method of estimating flood magnitude, hydrometeorology, forecasting of runoff, influence of water control structures on streamflow, and problems of water control operation. *Prerequisites:* Physics and algebra; elementary meteorology, statistics, and engineering desirable.

Soil Sciences

5-405. Soils: Their Nature and Geography (1960–61 and alternate years)

Spring, 3 credits — Roy W. Simonson

A descriptive course centered mainly on the nature and distribution of soils, especially their distribution in relation to other elements of the natural environ-

ment. The nature and properties of soils are discussed first with a minimum of technical terms, after which factors and processes of soil formation are considered briefly. The distribution of soils in broad regional patterns is then described with special emphasis on that in the United States. Reasons behind the patterns are also considered. Local patterns of soil distribution and explanations for them are discussed with examples chosen from different regions. The significance of patterns of distribution to present uses and to potentialities of soils for various uses are also considered. *Prerequisite:* College freshman chemistry, or its equivalent. Previous training in physical geography, geology, or plant ecology desirable.

[5-531.] Soils: Their Morphology, Genesis, and Classification (1961–62 and alternate years)

Spring, 3 credits — Roy W. Simonson

Designed to provide some understanding of the characteristics of soils, mode of formation, and classification. The nature of soil, including prevailing concepts and their evolution, is first reviewed briefly. Morphology of soils, expressed in the profile and its horizons, is considered next, using illustrations drawn from great soil groups in various parts of the world. Steps and processes of soil formation, or theories of soil genesis, are then discussed and related to present morphology and composition of soils. Principles of classification, their application to soils, and systems of soil classification are considered in some detail. Certain relationships between the nature and distribution of soils and their present use, the existing patterns of human occupancy, the potentialities under differing levels of technology, and their uses in construction are indicated during the discussions of morphology and classification. *Prerequisite:* College freshman chemistry, or its equivalent. Previous training in soils, geology, climatology, and mineralogy as well as some advanced chemistry desirable.

Meteorology

The following courses in meteorology are offered in cooperation with the United States Weather Bureau. The courses may be taken singly, or as a program leading to a certificate of accomplishment. Registration in these courses is not limited to employees of the Weather Bureau.

Certified Statements of Accomplishment in Meteorology

Two Certified Statements of Accomplishment are offered in meteorology. The required programs are outlined below. The First Certified Statement of Accomplishment in Meteorology may be awarded to the student who satisfactorily completes the required courses totaling 19 credits. A grade of "C" is required in each course. The Second Certified Statement of Accomplishment in Meteorology may be awarded to the student who completes the courses totalling 34 credits.

The required courses, Calculus and College Physics, are considered to be the absolute minimum in mathematics and physics. A more complete preparation, and the one recommended to the person who wishes to make meteorology his professional career, will require courses also in differential equations and vector analysis.

Courses in chemistry and statistics would be valuable, but not essential.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN METEOROLOGY

First Statement—Elementary

Required Prerequisite Courses:

Calculus
College Physics

Required Meteorology Courses:

General Meteorology (3)
Introduction to Dynamic Meteorology (6)
Synoptic Meteorology (6)
Weather Analysis and Forecasting (4)

Second Statement—Advanced

Courses required for the first statement plus the following:

Advanced Weather Analysis and Forecasting (6)

Electives (9 credits) selected from the following courses:

Agricultural Meteorology (3)
Applied Climatology (3)
General Oceanography (2)
Literature of Meteorology (2)
Meteorological Instruments and Observations (3)
Principles of Statistical Analysis (6)
Tropical Meteorology (3)

—o—

5-326. General Meteorology

Spring, 3 credits — HUGO V. GOODYEAR

A one-semester course in the fundamentals of the physical aspects of modern meteorology for the professionally interested student. Atmospheric composition and structure and their measurements; solar and terrestrial radiation, radiation laws; gas laws; adiabatic, pseudoadiabatic, and non-adiabatic processes; fronts; thunderstorms; fog; wind. *Prerequisite:* Two years of high school algebra and trigonometry.

5-330. Agricultural Meteorology

Fall, 3 credits — DONALD P. SPRINGER

An introductory course in the application of meteorology and climatology to operational problems in agriculture. Topics will include: micrometeorology applied to agriculture, a study of heat and water budgets in the plant zone of soil and atmosphere, elementary soil physics, and meteorology of enclosed spaces; agricultural climatology and microclimatology; effects of weather on agricultural production, including economic effects and physical effects on plants, animals, insects, and plant diseases; and weather services for agriculture, including specialized synoptic forecasts, utilization of climatological data, and instrumentation for agricultural observations. *Prerequisite:* Introductory meteorology, algebra, and trigonometry, or the consent of the instructor.

5-415. Applied Climatology

Fall, 3 credits — HERBERT C. S. THOM

The application of well known climatological methods toward solving specific weather problems of business, industry, air and surface transportation, and agriculture. Emphasis is placed on application of climatological methods in the solution of applied problems. The case method of class presentation is employed throughout the course. *Prerequisite:* A knowledge of the basic principles of meteorology.

5-534. Introduction to Dynamic Meteorology

Year, 3 credits each semester — William Malkin

An introductory course consisting of the application of the general principles of mechanics, thermodynamics, and fluid motions to the study of the atmosphere and its movements. *Prerequisite:* College physics, and mathematics through differential and integral calculus, or their equivalent.

5-536. Synoptic Meteorology (1960–61 and alternate years)

Year, 3 credits each semester — Jay S. Winston

Description and explanation of circulation and weather processes observed in the atmosphere, with emphasis on forecasting applications. First semester: air motion, three-dimensional structure of pressure and wind systems, cyclones, anticyclones, fronts, air masses, and prognosis of circulation patterns. Second semester: temperature forecasting, clouds and precipitation, fog and other visibility phenomena, thunderstorms, squall lines, tornadoes, turbulence, icing, sea breeze, and mountain and valley winds. *Prerequisite:* General Meteorology, college physics and calculus, or the consent of the instructor.

5-538. Weather Analysis and Forecasting (1960–61 and alternate years)

Year, 2 credits each semester — Jay S. Winston and Carlos R. Dunn

A laboratory course in which concepts of air masses, fronts, and mid-tropospheric flow patterns are applied to analysis and prognosis of sea level and upper air weather charts for North America and adjacent areas. Short range forecasts of various weather elements are prepared for local and regional areas of the United States. *Prerequisite or co-requisite:* Synoptic Meteorology, or the equivalent.

[5-580.] Advanced Weather Analysis and Forecasting (1961–62 and alternate years)

Year, 3 credits each semester — Jay S. Winston and Carlos R. Dunn

Treatment of many techniques and concepts that are of importance in present-day forecasting, including some of the more advanced developments. First semester: hemispheric synoptic map analysis, predicting motion and development of waves in the westerlies, numerical weather prediction, large-scale vertical motion and divergence, isentropic analysis, and the jet stream. Second semester: extended-range forecasting, statistical prediction methods, and forecasting tornadoes and severe thunderstorms. Lectures and laboratory. *Prerequisite:* Synoptic Meteorology, Weather Analysis and Forecasting, Dynamic Meteorology, or the equivalent.

5-581. Meteorological Instruments and Observations

Spring, 3 credits — Donald K. Halligan

This course is designed for the meteorologist rather than the instrument specialist. The basic principles of meteorological instrumentation will be presented, and the problems of measurement in the atmosphere studied to provide the student with a knowledge of the areas of applicability and the limitations of various meteorological instruments and observations. Laboratory demonstrations and field work will be used to provide the students with an opportunity to use a wide variety of meteorological instruments. *Prerequisites:* One year course in general college physics and general meteorological training, or experience, or the consent of the instructor.

5-589. Tropical Meteorology

Spring, 3 credits — Lester F. Hubert

Survey of major features of tropical climatology. Convection. Dynamics and kinematics of the tropics. Synoptic models. Hurricanes and typhoons. Forecasting, including hurricane path computation. Includes map analysis and laboratory work, in which streamline-isotach analysis is emphasized. *Prerequisite:* 20 hours of meteorology or the equivalent in experience. Calculus is desirable.

5-590. Literature of Meteorology

Spring, 2 credits — John Sherrod

Designed to provide a good knowledge of the meteorological literature and of the methods for using it. Sources of meteorological information are analyzed, and the important journals, books, and other published and non-published materials are described and classified. Methods of searching the meteorological literature are emphasized. *Prerequisites:* Professional training and/or experience in meteorology, or special permission.

Oceanography

5-360. General Oceanography

Fall, 2 credits — George H. Keller

A descriptive lecture course covering the characteristics of the oceans and the factors that control the distribution of properties and of plants and animals. Includes the physics, chemistry, geology and biology of the oceans. *Prerequisite:* College courses in at least two of the physical or biological sciences.

—o—

Certified Statement of Accomplishment in Oceanography

A program leading toward a Certified Statement of Accomplishment in Oceanography has been established in cooperation with the U. S. Navy Hydrographic Office. The courses are taught in Suitland, Maryland, and are open to anyone who can meet the designated prerequisites.

The requirements for the certified statement are twenty hours of credit distributed as follows:

(1) The following required courses: (Equivalent courses taken elsewhere may be substituted.)
- Biological Oceanography (2)
- Geological Oceanography (2)
- Mathematics for Oceanographers (2)
- Physical Properties of Sea Water (2)

(2) At least six hours of credit selected from the following courses:
- Applied Underwater Sound (2)
- Dynamic Oceanography (2)
- Marine Meteorology (2)

Ocean Surface Waves (2)
Practical Electronics for Oceanographers (2)
Principles of Underwater Sound (2)

(3) The remaining six hours of credit may be selected from courses offered by the Graduate School in fields related to oceanography, such as chemistry, physics, geology, geography, mathematics, engineering, meteorology, and biology. These electives should be selected by the student in consultation with the Registrar.

—o—

[5-582.] Mathematics for Oceanographers (1961–62 and alternate years)

Spring, 2 credits — Carsten M. Winger

An integrated course in college algebra, trigonometry, analytic geometry, and calculus with emphasis on these topics as they apply to problems in oceanography.

5-475. Principles of Underwater Sound

Fall, 2 credits — Instructor to be announced

Fundamental principles of acoustics and application of these principles to underwater sound. Consideration is given to transmission of sound in the sea, including refraction, reflection, scattering, attenuation, and fluctuation.

5-476. Applied Underwater Sound

Spring, 2 credits — Instructor to be announced

Applied theory and practice for those entering the field or working in related fields. Topics to be considered include ray theory, normal mode theory, sound channels, noise and reverberation, measurement techniques, and elements of transducer design. *Prerequisite:* Principles of Underwater Sound, or equivalent background in basic acoustics.

5-584. Physical Properties of Sea Water (1960–61 and alternate years)

Spring, 2 credits — Roy D. Gaul, A. Wayne Magnitzky

A detailed examination of the physical principles governing the properties of sea water; a comparison of these properties with those of pure water; the definition and calculation of salinity and density; distribution of salinity, temperature, and density.

[5-585.] Practical Electronics for Oceanographers (1961–62 and alternate years)

Spring, 2 credits — S. O. Bailey

Basic principles of electronic theory and elementary circuitry. Composition of various instrument components are demonstrated, with emphasis on methods of combining the components for specific instrumentation. Practical demonstrations and laboratory work.

5-655. Ocean Surface Waves (1960–61 and alternate years)

Spring, 2 credits — J. J. Schule, Jr.

The measurable properties of ocean surface waves and the methods of observing and analyzing ocean waves. The wave solution to the hydrodynamic equations is demonstrated. Discussion of the various sea surface models including their assumptions, solutions, and practical applications; the problems of propagation of waves in a dispersive medium. Examples of the various forecasting techniques. *Prerequisite:* Calculus, or Mathematics for Oceanographers.

5-658. Geological Oceanography (1960–61 and alternate years)

Fall, 2 credits — C. C. Bates

The topography and the composition of the ocean floor and coastal features, and the underlying causes. Emphasis is placed on dynamic processes and the deductive reasoning required to understand ocean features now being extensively observed with modern instrumentation. *Prerequisite:* Professional knowledge of oceanography or geology.

[5-662.] Marine Meteorology (1961–62 and alternate years)

Fall, 2 credits — M. D. Burkhart

An introduction to the fundamental principles of marine meteorology with special emphasis upon the problems of the marine climatologist and the physical oceanographer. Topics include: descriptive and synoptic meteorology; air mass analysis; boundary processes; radiation; and climatic principles. *Prerequisite:* Professional knowledge of meteorology or oceanography.

[5-664.] Dynamic Oceanography (1961–62 and alternate years)

Fall, 2 credits — J. J. Schule, Jr.

A short exposition of the principles of vector analysis precedes the main course topics. These include the development of the principles of conservation of mass and momentum; the vector equations of motion; the hydrostatic equations and the density-pressure-depth relationship; the various current equations; the principles of turbulence; the equation of mean motion; and various approaches to the problem of evaluating the eddy stress terms. *Prerequisite:* Physical Properties of Sea Water, and Mathematics for Oceanographers, or its equivalent.

[5-666.] Biological Oceanography (1961–62 and alternate years)

Spring, 2 credits — Byron B. Baker

Identification and descriptive analysis of the more important flora and fauna; detailed examination of the physico-chemical principles of the nutrient and carbon-dioxide systems; distribution of flora and fauna. *Prerequisite:* Professional knowledge of oceanography or biology.

Public Administration

DEPARTMENTAL COMMITTEE

JOHN H. THURSTON (Chairman)

GLADYS L. BAKER	G. E. HILBERT
TONY M. BALDAUF	MARTIN KRIESBERG
K. A. BUTLER	JOSEPH P. LOFTUS
JOHN C. COOPER	WILLIAM A. MINOR
THOMAS J. FLAVIN	ROSS POLLOCK
CLARE HENDEE	MAX P. REID
HENRY G. HERRELL	JOHN L. WELLS (Vice-chairman)

This program offers a general understanding of American government and the fundamentals of public administration. In appreciation of a sense of history in administration, it includes two basic courses in American history. A student who plans to take work in any of the other divisions of the department will find that the specialized courses are more meaningful and useful if he has first completed the courses in General Administration.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN PUBLIC ADMINISTRATION

COMMITTEE

GLADYS L. BAKER (Chairman)
MARTIN KRIESBERG JOHN H. THURSTON

Certified Statements of Accomplishment in Public Administration are granted to undergraduate and advanced students who complete an organized course of study in public administration intended to provide basic training for responsible administrative work.

Certified Statement of Accomplishment—Undergraduate

The program leading to the undergraduate certificate should be of special interest to:

1. Administrative assistants who wish to prepare for more responsible administrative positions.
2. Management Interns. Those who entered the service with a management option can profit from courses both more advanced and more specialized than those taken in college. Those who entered on various professional options and are now employed in such professions can profit very greatly from these courses if they expect, or wish to prepare, to enter into administrative work connected with their professional fields.

3. Persons in non-administrative specialties who expect to take on administrative duties, or who wish to enter into administrative work.
4. Persons in technical fields who wish to broaden their understanding of government administration.

Requirements (44 hours of credit)

Students seeking this statement should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

1. High school diploma or the equivalent. Applicants for the certificate must file a transcript of their high school or college work before completion of their certificate program.
2. Twenty semester hours of credit with grades of "C" or better in college level courses in the social sciences.

   Much importance is attached to general background courses in the belief that they help to broaden the thinking and understanding of the student so that he will possess a wider range of ideas and interests and sounder judgment of social values than would otherwise be the case. In consequence he will be able to render government service of a higher level of value. For this reason, these requirements will not be waived.

   The following courses must be taken:

   American or European Government, or Political Science
   Principles of Economics
   American or European History
   Introduction to Public Administration

   With the approval of the Registrar, credit will be given for six credit hours of tool courses related to work in public administration. These courses may be in accounting, economics, statistics, writing, or subject matter courses concerned with the work of the department or agency in which the student is employed.

   Equivalent courses will be accepted from other institutions to meet this requirement of general background courses.
3. Twenty-four semester hours of credit with grades of "C" or better in undergraduate and graduate courses in public administration, excluding all accounting courses except Internal Auditing. The twenty-four credit hours are to be distributed as follows:

a. A minimum of six credits from the Division of Management Analysis.
b. The remaining eighteen credits may be selected from the Divisions of General Administration, Financial and Budgetary Administration, Legal Administration, Personnel Administration, Procurement and Property Management, or additional courses in Management Analysis. Students are advised to include in their programs at least one course from each Division.
c. Upon prior approval of the Registrar, credit for courses outside the Department of Public Administration (including not more than two courses in office techniques and operations) may be applied when such courses are properly in line with the student's major interest.
d. When the student has completed the social science requirements and fifteen hours in public administration, he should review his course of study with the Registrar.

Certified Statement of Accomplishment in Management—Advanced

This certificate is granted to students who complete an organized course of study intended to provide advanced training in management. The program should be of interest not only to persons who are responsible for management of operating programs, but also to those in specialized fields of management who wish to add perspective to their work, to persons who wish to prepare for more responsible administrative positions, and to scientific, technical, and professional people who have or expect to have administrative responsibilities. The requirements have been established with the aim of assuring the students a broad coverage of the major areas of administration.

Requirements (20 hours of credit)

Students seeking this certificate should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

1. Government experience at the level of GS-9 or above, or a Bachelor's degree, or a Certified Statement of Accomplishment in Public Administration.
2. Twenty semester hours with grades of "B" or better in courses distributed as follows:

   a. A minimum of fifteen semester hours selected from the following:

Budgetary and Financial Administration (2)
Employee Training and Development (3)
Executive Staffwork (3)
Human Relations in Administration (3)
Principles and Practices of Management (2)
Readings and Papers in Public Administration (3)
Seminar in Management (2)
Supervision (2)
Techniques of Organization (3)

b. The remaining semester hours shall be selected from courses numbered 500 or above in public administration or, with the approval of the Registrar, in other social sciences.

c. When a student has completed twelve hours in public administration courses, he should notify the Registrar so that he may be assigned to an advisor.

Certified Statements of Accomplishment with Honors

Students who complete the requirements for the Certified Statement of Accomplishment in Public Administration (undergraduate) or the Certified Statement in Management (advanced) with an average of "B" or higher may qualify for honors by passing an oral examination. The examination is given by a panel set up by the Graduate School. Students who wish to take the examination should apply to the Registrar at the completion of their programs.

General Administration

COMMITTEE

Martin Kriesberg (Chairman)

Gladys L. Baker Jack Koteen A. J. Nichols

These courses offer a general understanding of American government and the fundamentals of public administration. In them a special emphasis is placed on the relationships of citizens and public employees.

A student who plans to take work in any of the divisions of the department will find that the specialized courses are more meaningful and useful if he has first completed the basic courses in this division.

6-341. American National Government

Fall, 2 credits. Repeated in Spring Salvatore Nerboso

History and origins of the national Government of the United States; the political process—parties and elections; the legislative process; the functions of

the national Government and their administration; and courts and judicial review of legislation.

4-201. Supervision (*See* p. 49)

6-344. Introduction to Public Administration

Fall, 2 credits — NORMAN B. BECKMAN

This is a survey designed to introduce the student to the elements of public administration and to lay the foundation for further study and practice in the field. Topics covered include: the nature and scope of administration in Government, policy making and planning in a democracy, administrative organization, problems and procedures in running a government, and organization and responsibilities of public officials.

6-347. Principles and Practice of Management

Fall, 2 credits — EDWARD F. WILSON

A study of the knowledge and managerial responsibilities that distinguish professional managers from other professional personnel, in terms of both theory and application. Analysis of the principles of planning, organizing, directing and controlling, and their application as encountered in public administration. Development and discussion of ways by which these management principles can be used by class participants in executing their supervisory responsibilities. *Prerequisite:* Supervisory work experience at Grade GS-9 or above, or special permission.

6-400. Administrative Operations for Congressional Assistants

Spring, 2 credits — JEROME N. ELLER

This course deals with the practical administrative problems encountered by secretaries and other staff assistants to U. S. Senators and Congressmen. Such matters as the following are considered: organization of office routine; preparation and distribution of newsletters and publicity releases; special services available to members of Congress; the use of Senate and House Documents and reports; relations with the Executive departments; pressure groups; relations with constituents; the practical workings of Congress; and assistance with legislative matters.

6-449. Seminar in Management

Spring, 2 credits — Coordinators to be announced

Designed for Government officials having some management responsibilities. The course will be conducted largely by guest lecturers, top-level government officials in special fields such as budgeting and finance, program planning, public relations, and others. *Prerequisite:* Supervisory work experience at grade GS-9 or above, or special permission.

6-453. Human Relations in Administration

Fall, 3 credits — JAMES M. ENNEIS

Designed to develop the student's understanding of and insight into interpersonal relationships in large-scale organizations. The course includes value orientations in administration; formal and informal organization; pathologies in administration; status and role; power and authority; styles of leadership; authoritarian and democratic administrators; career dynamics; psychological stress in administration; and motivation and morale.

6-454. Applied Human Relations in Administration

Spring, 3 credits — James M. Enneis

Designed to give students practice in applying principles of human relations in administration. The course includes diagnoses of social processes in administration; skills of effective performance in face-to-face situations; formulation and assignment of administrative objectives; creating appropriate social climate; leadership skills; utilizing member resources; irrational factors in administration; and decision-making processes. *Prerequisite:* Course 6-453, or the consent of the instructor.

6-459. Executive Staffwork

Fall, 3 credits — Truman G. Benedict

To help students formulate and use systematically a personal philosophy and system for executive staffwork. Suitable for individuals presently in staff positions, or who expect to do staffwork. Also for staff specialists and for chiefs of staff offices. Applicable to all staff specialties: budget and accounting, management services, administrative services, supply, organization and methods, personnel, manpower, programming, and others.

The course teaches an integrated system of executive staffwork. It suggests step-by-step methods and employs visual tools systematically. Practice and critique in preparing and making presentations to executive groups. Methods, especially graphic methods, for the systematic identification, visualization, analysis and solution of major executive problems are demonstrated, explained and practiced by students. All students practice devising and applying methods for solution of problems from their own work situations, and of their own choosing, with instruction, coaching and constructive critique. The course stresses innovation, and how to achieve innovations. Illustrated with graphic materials and methods used in evolving military-civilian staffing policies and patterns, and career programs, in a large military agency.

6-600. Readings and Papers in Public Administration

Fall, 3 credits. Repeated in Spring — John H. Thurston, Coordinator

Under the guidance of a senior administrative official, supervised readings with monthly conferences on specified topics of administration or individual research and a paper on some problem or phase of administration. Readings or problem to be investigated are determined in consultation with adviser. *Prerequisite:* Completion of all other requirements for the undergraduate or graduate certified statement of accomplishment in public administration. The course may be taken, with the approval of the coordinator of the course, by students who are not candidates for certified statements if they have the equivalent background in public administration.

American History

6-250. American History to 1865

Fall, 3 credits — Wayne D. Rasmussen

A survey of the political, social, economic, and cultural forces, prior to 1865, that have contributed to the development of American civilization. The course includes a summary of the colonial period; the political, economic, and diplomatic factors of the American Revolution; and the development of national life and institutions.

6-251. American History since 1865

Spring, 3 credits — Wayne D. Rasmussen

A survey of the political, social, economic, and cultural forces that, since 1865, have contributed to the development of present-day American civilization. The course includes the frontier movement and immigration; constitutional growth and changes in world relations; and economic change and development.

Management Analysis

COMMITTEE

Joseph P. Loftus (Chairman)

N. Robert Bear
Edmund D. Dwyer
Arthur B. Jebens
Mark M. Kirkham
Harold A. Stone
James H. Stover

The courses outlined below stress particularly the standards of performance to be observed by management analysts. As staff assistants to operating officials, management analysts should possess broad knowledge of and skill in applying management theories, principles, and techniques. Understanding of specialized subject-matter areas is also important.

In combination, the objective of the several courses is to inculcate basic qualifications necessary for the study, evaluation, and improvement of management policies, practices, methods, and procedures.

6-405. Principles and Techniques of Management Analysis

Fall, 2 credits — John H. Finlator

Introductory course and general survey of principles and techniques applicable in the organization and management of Federal agencies. Emphasis on the role of the management analyst in assisting responsible officials to plan organization structure, to conduct management surveys, to establish administrative goals, and to simplify work methods. Discussion of qualifications needed for management analysis work and the relationship of this function to other agency activities. Designed to familiarize the student with basic substantive knowledge essential in the field of management analysis. *Prerequisite:* Experience in management analysis, or the consent of the instructor.

6-407. Staff Function of Management Analysis

Spring, 2 credits — Instructor to be announced

Advanced course dealing with the study of management problems and their solution through staff units engaged in management analysis. Trends in modern management, stimulation of improvements in agency operation, relation of delegation of authority to organization, headquarters and field relationships, and role of staff units in establishment of management controls and evaluation of results. From the perspective of top management, the student undertakes comprehensive study of elements of management analysis essential to an effective staff function. *Prerequisite:* Principles and Techniques of Management Analysis, or the consent of the instructor.

6-406. Principles of Management

Fall, 2 credits. Repeated in Spring — Walden Coggeshall, William F. Rapp

Basic course covering the nature of modern management, and principles and best practices involved in the management process. Subject matter studied in terms of basic functions in management; namely, planning, organizing, directing, coordinating, and controlling. Case materials used for illustration. This course is offered when there is demand from individual students or a federal agency on a contract basis.

6-409. Conduct of Management Surveys

Spring, 2 credits — JOHN H. FINLATOR

Methods useful in management surveys, with emphasis on techniques required in fact-finding, logic necessary in analysis, and "selling" required in presentation of recommended solutions for identified problems. Study of the comprehensive management survey including, but not limited to, reconnaissance, organization, functional, procedural, and special purpose surveys, survey workshops, and case studies. Designed to give the journeyman analyst opportunity for advancement in the field of management analysis. *Prerequisite:* Experience in management surveys, or special permission.

6-410. Management of Directives Systems

Fall, 2 credits — CHARLES E. WYLIE

Review of basic systems of instruction- and order-communication in an agency. Emphasis on developing, installing, and operating an agency directives management system. Study and case-work on theory and practices encountered in running a directives management shop. Includes relationships with other staff services and systems, types and uses of directives, numbering and reference systems, processing directives from planning to approval, preparation of masters, reproduction and distribution, transmittal and maintenance control systems. Designed for personnel with staff or coordinating responsibilities, including directives management activities. Also for those in charge of a directives management operation, or those working in some major phase of a directives management operation who wish to broaden their knowledge and effectiveness.

6-412. Reports and Forms Management

Fall, 2 credits. Repeated in Spring — EDWARD J. LEWIS and WILLIAM B. RICE

Designed to provide students with a comprehensive knowledge of forms and reports management systems and how to operate them. A study of: various systems used for controlling forms and reports; different techniques used in Government for forms design and format; standards and printing specifications; methods for analyzing forms and reports; and how to install and operate forms and reports management programs. Analysis of forms and reports by case studies with group discussion of techniques involved. Special lectures by top technicians from representative Government departments.

6-519. Work Standards and Work Measurement

Fall, 2 credits. Repeated in Spring — SIDNEY SCHNEIDER

A study of the most advanced techniques of scientific management concerned with development of work standards and measurement of work loads and performance, and of their adaptability in public administration. Statistical and experimental methods of determining standards. Dangers to avoid in setting standards. Time study. Standards as a dynamic part of operations, and a tool in developing policies on personnel placement and training. Standards as aids in developing budgets, in planning operations, and in individual work planning. Relationship of standards of performance to those of costs and quality. Importance of dependable standards, measurement and appraisal of performance to summary statements of progress for the use of higher administrative officials. *Prerequisite:* Practical working experience at Grade GS-7 or above, or the permission of the instructor.

6-550. Techniques of Organization

Spring, 3 credits — GUSTAV C. HERTZ

Organization of public and private agencies. A brief historical review of organization, including church, military, and modern industry. The division of work. Delegating responsibility. Span of control and unity of command. The

staff assistant and staff specialist. Group decision-making. Decentralization and the problems of coordination when geographically dispersed. Process of reorganization, including timing, development, and implementation. The organization chart and manual. Case studies. *Prerequisite:* A course in public administration, scientific management, or management analysis.

Financial and Budgetary Administration

COMMITTEE

John L. Wells (Chairman)

Charles L. Grant Frank H. Spencer

Carl W. Tiller

Students desiring a knowledge of how the Government obtains, budgets, and manages its money will find helpful some of the courses in general administration as well as the specialized courses in this division. Those with limited experience in this field should begin their study with Federal Budgetary Procedure in the Division of Office Techniques and Operations, and the general administration courses before attempting the advanced course in Budgetary Administration.

4-112. Federal Fiscal Procedure (*See* p. 49)

[6-525.] The Federal Financial System (1961–62 and alternate years)

Fall, 2 credits Carl W. Tiller

A comprehensive summary presentation of Federal fiscal administration, presented primarily on a lecture basis, and including review of the roles of major participants: Treasury, Government Accounting Office, Congressional Committees, Bureau of the Budget, and operating departments. Designed to provide an understanding of the financial organization and procedure of the Federal Government, including its fund and account structure, methods of financial control, the use of financial reports, and related subjects. An orientation course for persons working in some part of the area of financial administration, such as budgeting or accounting, and for general or program administrators who wish an overall picture of the financial structure of the Government. *Prerequisite:* Bachelor's degree, experience at Grade GS-6 or above, or the consent of the instructor.

6-635. Budgetary and Financial Administration

Fall, 2 credits Charles L. Grant

This is an advanced, one-semester course for experienced budget and administrative personnel. Covers the broad phases of budgetary and financial administration in the Federal Government primarily from the point of view of the operating departments. Emphasizes the role of budget formulation and execution in the relationships between the legislative and executive branches of the Government and among the staff operating agencies within the executive branch. The first half of the course deals with the pre-appropriation phases of budgeting, including formulation, review, and congressional enactment of the budget. Topics discussed include: the role of budgeting in program formulation; the role of bureaus, departments, Bureau of the Budget, the President and Congress in budgeting; and content of the budget and of departmental estimates and related budgetary materials. The second half of the course deals with the

execution of the budget after it is enacted by Congress and the relationships of administrative planning and control, accounting, auditing, and financial reporting to budget execution. *Prerequisite:* Bachelor's degree and an introductory course in public administration, or experience at a responsible level in budgetary, financial, or general administration, or consent of instructor.

Personnel Administration

COMMITTEE

Max P. Reid (Chairman)

Jack H. Foster
C. O. Henderson (Vice-chairman)
Henry F. Hubbard
Harold H. Leich
William T. McDonald
James C. O'Brien
Ross Pollock
William Rogers
John A. Watts

The student is urged to take the introductory course in public administration before concentrating on the program in this division. Unless substantial experience can be substituted, the general course, Public Personnel Administration, should be taken before the specialized courses (such as Position Classification, Employment and Placement, and the like). Persons who are in positions classified at GS-5 or below and desire to prepare for personnel work should begin with Federal Personnel Procedure in the Department of Office Techniques and Operations. They should not attempt to take the specialized courses until they have gained substantial experience in personnel work or have completed all the basic, general courses.

4-201. Supervision (*See* p. 49)

4-114. Federal Personnel Procedure (*See* p. 50)

6-305. Safety Program Administration

Fall, 2 credits — William C. Pope

Nature of a safety program and its value for management. Answers to practical safety management problems in large and small organizations. Consideration of nontechnical aspects of safety program management, including purpose, philosophy, and objectives; authority, policy, and functional relationships; required elements; accident information management; and translation of the duties of the safety inspector and engineer for the nontechnical safety program administrator. Designed for employment, training, property management, and general administrative personnel in Government and industry, responsible for, or engaged in, safety program management.

6-430. Public Personnel Administration

Fall, 3 credits. Repeated in Spring — Instructor to be announced

Designed for supervisors and administrators wishing to have general familiarity with personnel work, for those in junior personnel staff positions desiring a broad understanding of personnel administration, and for those desiring to enter the field who need a foundation for the more specialized courses in the personnel field. Personnel problems that arise when people are associated to-

gether in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities of the supervisor and the personnel officer with respect to personnel administration; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship to overall management.

6-444. Position Classification

Fall, 2 credits. Repeated in Spring

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

Covers the fundamental concept of position classification and its uses; relation of classification to compensation and other phases of personnel management; analysis of the Classification Act of 1949; identification, analysis and application to specific positions of factors determining class and grade levels; discussion of job evaluation techniques; and application of position classification in the Federal service including operating policies, practices, and procedures. *Prerequisite:* One of the following: Course 6-344 or 6-430 in Public Administration; Grade GS-4 or above in personnel work; 60 semester hours of college work.

6-448. Salary and Wage Administration

Fall, 2 credits WALTER H. HAND

Purposes, principles, and methods of salary and wage administration, with emphasis on compensation plans for trade, craft, and labor occupations. Study and discussion of various concepts and methods currently used in government and industry, including job analysis, job evaluation, labor market analysis, wage and salary surveys, schedule construction, and within-grade advancement plans. *Prerequisite:* Course 6-444, or experience in position classification, and/or pay administration work.

6-458. Advanced Salary and Wage Administration

Spring, 2 credits WALTER H. HAND

Problems in administering pay programs; compensation of supervisors; pay relationships among white and blue collar positions; incentive systems; the role of line management in pay programs; coordination of pay programs; and labor relations aspects of pay fixing. *Prerequisite:* Course 6-448, or experience in pay administration.

6-512. Employment and Placement

Fall, 2 credits. Repeated in Spring JOHN R. GARNETT

Basic factors in today's employment market; qualification standards, promotion and other in-service placement programs; college recruitment, and other planned intake programs; examining, selection, and utilization principles and practices for professional and administrative jobs; career planning. Class discussion determined by specific student interests.

6-514. Interviewing Workshop

Fall, 2 credits JOHN R. GARNETT

Directed at bettering the skills of employment, placement, classification, employee relations, and other personnel, administrative and operating persons whose duties involve interviewing. Lecture, discussion, and text on cultural concepts, principles of psychology, techniques and methods. About half the time devoted to participation and observation in role-playing case studies. *Prerequisite:* One course in personnel administration, or current employment in position involving considerable interviewing.

6-518. Employee Training and Development

Fall, 3 credits. Repeated in Spring — James G. Stockard

How to develop the human resources of an organization. Informal presentation of ideas for organizing, staffing, financing, selling, evaluating, and recording training activity. Explanation of benefits of the Government Employees Training Act (Public Law 85-507). Interpretation of training implications of manpower picture for the 1960s. Demonstration of training methods and devices that have met the test of successful programs in government and industry. The course is of direct value to personnel technicians, budget analysts, methods analysts, and supervisors. Orientation for foreign technicians, teachers, and others whose work requires an appreciation of the adult training and education methods of the modern business world.

6-453. Human Relations in Administration (*See* p. 67)

6-454. Applied Human Relations in Administration (*See* p. 68)

Legal Administration

COMMITTEE

Thomas J. Flavin (Chairman)

Ralph F. Koebel — David Reich

Ashley Sellers

6-320. Administrative Law and Procedure

Fall, 2 credits — Thomas J. Flavin

A study of the principles and the practice of administrative law in the Federal field with concentration upon the provisions of the Administrative Procedure Act (1946) dealing with formal rule-making and adjudication and involving notice, hearing, evidence, findings, and control by the courts.

6-422. Business Law

Year, 2 credits each semester — Herbert L. Perlman

Aspects of law essential to the conduct of modern business. Forms of business organization, bailments, property, sales, mortgages, negotiable instruments, contracts. This course is so arranged that students may attend both semesters or either semester. No subject matter, however, will be repeated.

6-425. Legal Aspects of Investigation—Criminal Evidence and Procedure

Spring, 2 credits — Ralph F. Koebel

Designed to provide investigative personnel and those desiring to prepare for such work, background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or for other procedure. Because all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects.

Procurement and Property Management

COMMITTEE

Tony M. Baldauf (Chairman)

George D. Ferrare
Paul H. Riley
Marie M. Smith
N. O. Wood, Jr.

Courses in this field consider how the Government purchases, manages, and accounts for materials and supplies. Those interested in purchasing but with limited experience in such work will find it helpful to begin with the courses in Federal Purchasing Procedure and Federal Property Procedure before attempting the management courses.

Selected background courses in public administration together with courses in the Division of Organization and Management will provide a thorough training in administration in this area.

4-113. Federal Property Procedure (*See* p. 49)

4-115. Federal Purchasing Procedure (*See* p. 50)

6-367. Federal Contracting

Spring, 2 credits — Tony M. Baldauf

A course devoted to contracting as a technique of purchasing where advertising is required, including the study of legal and administrative policy background of contract provisions, requirements of advertising, analysis of bids, contract award and administration, the handling of disputes, appeals, protests, change orders, amendments, construction contract procedures, debarment procedures, and related subjects. The practical application of these requirements by preparation of bids, contracts, orders, and related matters.

6-370. Government Construction Contracts

Fall, 2 credits — Harold F. Blasky, Paul H. Gantt

This course deals with the basic principles of Government contract law, with special emphasis on construction contracts; principles of Government contract administration; study of contract general and special provisions; administration of the Davis-Bacon Act, the Miller Act, and other laws pertaining to construction contracts; the handling of contract modifications, changes, suspension of work, damages; study of landmark cases in the courts, with decisions of the Appeal Boards and the Comptroller General; and study of case problems. Prominent Government contract experts will lecture on various phases of construction contract administrative and legal problems.

6-371. Advanced Government Construction Administration

Spring, 2 credits — Paul H. Gantt

Consideration of complicated problems of a recurring nature in Government construction administration. Landmark cases will be studied, and the problems will be traced from their inception to their disposition by contracting officers and review authorities. Contract appeal boards and litigations in the courts will be considered. Seminar discussion, with written materials. Prominent construction experts from Government and industry will participate in lectures. *Prerequisites:* Course 6-370, or the consent of the instructor.

6-638. Government Defense Contracts

Fall, 2 credits JULIUS SILVERSTEIN

Laws and problems in defense contracting by the Federal Government, including such subjects as cost-plus contracts, contingent fees, priorities, subcontracting, escalation, financing, renegotiation, contract termination, and surplus property.

8-405. Principles of Specifications (*See* p. 94)

ACCOUNTING

COMMITTEE

JOHN C. COOPER (Chairman)

PAUL L. APPLEMAN
ROBERT H. FUCHS
WARNER H. HORD
CHARLES N. MASON
ROBERT W. MAXWELL
HERSCHEL C. WALLING

The Graduate School offers accounting courses primarily as a means of training for the *public* service. The curriculum necessarily includes courses in general accounting because the basic principles are essential for Government accounting.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ACCOUNTING

The scope of accounting in the Federal service is wide. There are increasing demands for accountants having a knowledge of commercial as well as Government accounting. These demands have come as a result of the formation of many Government corporations and Federal regulatory agencies, and the development of the Joint Program to Improve Accounting in the Federal Government. The Joint Program is a Government-wide cooperative effort under the joint leadership of the Comptroller General of the United States, the Secretary of the Treasury, and the Director of the Bureau of the Budget, to make accounting of maximum usefulness to all concerned. Its purpose is to give the President better management in the executive branch, the Congress better information for acting upon appropriations and other legislation, and the public a clearer picture of the financial condition and operations of the Federal Government. Hence, the accounting program required for a Certified Statement of Accomplishment is broad enough to cover not only the regular appropriation accounting of the Federal Government, but also the accounting training needed for many other governmental activities. The program is comprehensive enough both to provide advanced training for the Government service, and also, if courses are carefully selected, to meet the usual educational requirements for C.P.A. examinations. Students planning to take C.P.A. examinations should know the

requirements of the state in which they plan to take the examination. In general, their study, in addition to accounting, should include the following: Principles of Economics, Corporation Finance, Investments, Mathematics of Accounting and Investment, Business Law, and Business English.

Requirements for Certified Statement

1. High school diploma or the equivalent.
2. Thirty-six semester hours of credit with grades of "C" or better in the courses listed below and distributed as follows:
   a. All of the required courses.
   b. Eleven semester hours of credit from the elective courses.

REQUIRED COURSES

Courses	*Number of Semesters*	*Semester Hours Credit*
Principles of Accounting	2	6
Intermediate Accounting	2	6
Cost Accounting	1	3
Auditing	2	4
Advanced Accounting	2	6

ELECTIVE COURSES

Federal Government Accounting	2	4
Federal Income Taxes	1	3
Analysis and Interpretation of Financial Statements	1	2
Mathematics of Accounting and Investment	1	3
Budgetary Administration	1	2
Cost Accounting (Second Semester)	1	3
The Federal Financial System	1	2
Internal Auditing	1	2
Business Law	2	4
Principles of Economics	2	6
Writing Procedures and Instructions or Official Writing	1	2

—o—

6-352[a]. Principles of Accounting—First Half

Fall, 3 credits. Repeated in Spring and Summer

PAUL S. CARTER
MARVIN H. LEVENBERG
HERBERT G. MARSHALL
WILLIAM H. ROWE
HAROLD J. SELENSKY

Elementary principles of accounting; discussion and problems. At the end of the semester students will be prepared to do the accounting necessary for a small business organization; *i.e.,* keep a complete set of books, draw up statements at the end of the fiscal period, adjust the accounts for accruals, deferred items, depreciation, etc., and close the books. *Prerequisite:* High school graduation, or the equivalent.

6-352[b]. Principles of Accounting—Second Half

Spring, 3 credits. Repeated in Summer and Fall

PAUL S. CARTER
HERBERT G. MARSHALL
WILLIAM H. ROWE
HAROLD J. SELENSKY

Continuation of first half covering more advanced principles of accounting; accounting for partnerships, corporations and manufacturing; depreciation policies and analysis of financial statements. *Prerequisite:* First half, or the equivalent.

6-353[a]. Intermediate Accounting—First Half

Fall, 3 credits

WARNER H. HORD
CLARK L. SIMPSON

Advanced principles of manufacturing accounting, corporation accounting, and valuation as applied to current assets, fixed assets, intangibles, and liabilities, reserves and funds, and installment sales. *Prerequisite:* A first-year course in accounting.

6-353[b]. Intermediate Accounting—Second Half

Spring, 3 credits

WARNER H. HORD
CLARK L. SIMPSON

Advanced principles of partnership accounting, including formation, operation, and dissolution; joint ventures; consignments; agencies and branches; application of funds. *Prerequisite:* First half, or the equivalent.

6-264. Federal Government Accounting

Year, 2 credits each semester

CHARLES I. JENKINS

The fall semester is devoted to a description of the financial organization in which the accounting is performed and its relationship with the Treasury Department and the General Accounting Office; explanation of, discussion on, and practice work with the basic ledgers (allotment ledger, object classification ledger, and general ledger) maintained in connection with funds made available to Federal agencies; an explanation of and discussion on: the appropriation, apportionment, allotment, obligation, disbursement and collection processes; the relationship of accounts maintained in the agency with accounts maintained by the Treasury Department; the reconciliation of cash accounts with statements furnished the agency by the Treasury Department; the relationship between general ledger control accounts and subsidiary records.

In the spring, this work and discussion are continued with respect to the general ledger but involving more complex transactions such as inventory accounting; an explanation of and discussion on: accounting in a decentralized operation; accrual accounting concepts as applied to appropriated funds; the year-end closing of accounts and financial reporting and its relationship with the Treasury Department. A detailed study is given to accounting problems with special emphasis on the principles of controls and recent developments in accounting in the Federal Government. In each semester, as applicable to the subject under discussion, related reporting and accounting procedures and applicable General Accounting Office instructions are explained and discussed. *Prerequisites:* Principles of Accounting and Federal Fiscal Procedure, the equivalent, or experience in accounting operations.

6-420. Advanced Accounting—Theory and Problems

Year, 3 credits each semester

LAURENCE W. ACKER

A comprehensive study of advanced principles of accounting together with their application to specific problems. Special consideration is given to con-

solidated statements; foreign exchange; receivership; estates and trusts; public accounts. Emphasis is placed on problems in accounting theory and practice such as are generally given in C.P.A. examinations. *Prerequisite:* Intermediate Accounting.

6-423. Mathematics of Accounting and Investment

Spring, 3 credits — Ralph R. Botts

Calculation of compound interest, compound discount, amount and present value of annuities. including perpetuities and capitalization methods of determining valuation. Special attention given to accumulation of sinking funds and the amortization of debts by equal payments, with applications to open-end mortgages. Also covers yield and valuation of bonds, various depreciation methods, and exact and approximate methods of determining interest rates charged on time purchases and small loans. Some attention given to life probabilities and the calculation of premiums and cash values for the more common types of life insurance and annuities. Accounting applications and entries are discussed upon request. *Prerequisite:* Applied Business Algebra, or the equivalent.

[6-510.] Analysis and Interpretation of Financial Statements (1961–62 and alternate years)

Spring, 2 credits — Herschel C. Walling

Methods and techniques of preparing, analyzing, and interpreting financial statements of business and Government enterprises, particularly working capital and revolving funds and Government-owned corporations. The course covers the nature and limitations of financial statements, and terminology, content, and organization, and the determination and interpretation of trends and ratios for both internal and external users of the financial statements. *Prerequisite:* Principles of Accounting.

6-525. The Federal Financial System (*See* p. 71)

6-642. Cost Accounting (1960–61 and alternate years)

Year, 3 credits each semester — James H. Lobb

A thorough and comprehensive treatment of the principles of cost accounting, together with the methods of their application to specific problems. By means of lectures, textbook study, and problems, full consideration is given to the methods of cost accounting for materials, labor, direct and indirect expenses in their relationship to specific job orders; process, departmental and standard costs; and the control accounts. *Prerequisite:* Principles of Accounting.

6-645. Federal Income Taxes

Fall, 3 credits — Eugene C. Moyer

Principles of federal income taxation applied to individuals, partnerships and corporations for determination of gross income, deductions credits and exemptions. Forms of various tax returns; application of principles of accounting.

6-684. Internal Auditing (1960–61 and alternate years)

Year, 2 credits each semester — John C. Cooper, Jr.

A comprehensive study of the philosophy and purpose of internal audit. Emphasis is placed on the use of this function as an aid to management and operating officials in the Federal Government. The course reflects the current concept that internal auditing is an important management control that functions by review and appraisal of other management controls, and, accordingly, (1) reviews and appraises the adequacy of policies, plans, and procedures, (2) as-

certains compliance with policies, plans, procedures, regulations, and laws, (3) ascertains whether agency assets are properly safeguarded and accounted for, and (4) ascertains the degree of reliability of accounting and supporting statistical data. Special consideration is given to the development and utilization of internal audit in the Federal Government, the placement of the internal audit function in the organization, its relationship to line operations and line inspections, and its relationship to external audits. Staffing and organization of an internal audit unit, planning of audits, techniques for performance of audits, audit manuals, and reports are covered. Extensive use is made of case studies and specific illustrations drawn from experiences in Government agencies. Guest lecturers include authorities in the field who are presently conducting internal audit operations. *Prerequisite:* Experience in internal audit, administrative or management analysis at GS-7 level or above, or completion of courses in advanced accounting or auditing.

[6-693.] Auditing (1961–62 and alternate years)

Year, 2 credits each semester — JOHN C. COOPER

The fall semester is devoted to the study of the fundamental principles of public or commercial-type audits. Consideration is given to the purposes and types of audits; the responsibility of the auditor; planning and performing audits. Special emphasis is placed on problems in audit theory and practice such as are generally given in C.P.A. examinations.

In the spring semester, emphasis is placed on case studies in auditing and the application of audit principles. *Prerequisite:* Intermediate Accounting.

Social Sciences

DEPARTMENTAL COMMITTEE

BUSHROD W. ALLIN (Chairman)

JOHN M. BREWSTER
MARY L. COLLINGS
SHERMAN E. JOHNSON
PAUL E. NYSTROM
HAROLD B. ROWE
CARL C. TAYLOR
ROBERT C. TETRO
JAMES E. THIGPEN
HARRY C. TRELOGAN (Vice-chairman)
FREDERICK V. WAUGH
BENNETT S. WHITE, JR.

PURPOSE AND SCOPE

Social science deals with people and the problems of human relationships, as contrasted with natural or physical science, which deals with things and the problems arising out of physical relationships.

The problems of social organization and operation have become both absolutely and relatively more important with the increase in complexity of our industrial civilization. More and more, people are concerned with the organization of production, the distribution of goods and income, and with price policies. The individual as a consumer and investor, the businessman and the farmer as producers, find increasing need for a knowledge of economics and other social sciences. Large corporations are employing growing numbers of economists to help in the formulation of policy. Psychologists and social workers are finding a demand for their services in personnel work. And, the large number of Federal, state and local government agencies need more people adequately trained in social science.

Social science is divided into a number of closely allied fields including economics, sociology, political science, history, law, and psychology. A broad grasp of any one of these subjects implies at least some familiarity with the others, because of the many interrelationships among these studies. Yet the continued development of each social science has given rise to larger and still larger bodies of knowledge relating to it, until only through a considerable degree of specialization can the student hope to master any one part. Thus the great need is for people who have concentrated sufficiently on one phase of a social science, such as marketing in economics, to be thoroughly familiar with the details of fact and principles involved, yet who also have a broad underlying training in the allied fields.

The courses offered by the Graduate School are designed to aid in acquiring a general background in the social sciences, as well as the specialized training in particular fields that is necessary for successful work in many Government departments and in private business.

General Economics

COMMITTEE

Bushrod W. Allin (Chairman)

James P. Cavin — Kenneth E. Ogren
Nathan M. Koffsky — Frederick D. Stocker
William A. Vogely

Adequate foundation training in general economics is essential for satisfactory accomplishment in the study of any specialized branch of the subject. Hence, the primary objective in developing the following list of courses has been that of providing the basic work needed by students who wish to carry out a systematic plan of study, at both undergraduate and graduate levels.

7-201. Principles of Economics

Year, 3 credits each semester — Frederick D. Stocker

A survey course designed to familiarize the student with the basic tools of economic analysis. Emphasis is given to the application of economic principles to policy questions, both of current and continuing importance. Among the topics covered are (1) production, income, and the creation of wealth; (2) business organization and finance; (3) money and the banking system; (4) control of business fluctuations; (5) international trade; and (6) the distribution of income. While it is advisable that students registering for the second semester have completed the first semester, qualified students may be admitted at midyear.

3-509. Mathematics for Economists (*See* p. 39)

7-528. International Trade and Commercial Policy (1960 61 and alternate years)

Fall, 3 credits — Howard S. Piquet, William A. Vogely

The course is oriented toward an understanding of the role of international trade in the United States economy. A survey of the theory of comparative costs and international values forms the foundation for investigation of specific commercial policy problems. Balance of payments, exchange rates, tariffs, customs unions, and other problem areas are analyzed in the light of their effects on national income, employment, and national security. The institutional structure, including the Reciprocal Trade Agreements Act, the General Agreement on Tariffs and Trade, the International Monetary Fund, and the proposals of the Havana Charter, and empirical data on the pattern of world trade are stressed throughout. The course provides an overall view of the theory and practice of United States commercial policy. *Prerequisite:* Consent of the instructor.

[7-548.] Economic Analysis

Year, 3 credits each semester — WILLIAM A. VOGELY

The course is concerned with methods of economic analysis. Emphasis is placed upon the exposition and evaluation of theoretical models explaining the relationships among various sectors of the economic system. Empirical applications of these tools of analysis are studied. The first semester is primarily concerned with analyses of the behavior of firms, households, and industries. The theories of demand, production, distribution, and price are studied intensively, including systems of both partial and general interdependence. The second semester is primarily concerned with analyses of the behavior of economic aggregates. The theories of employment, national income, and economic development are studied, with particular attention to the contributions initiated by Lord Keynes. *Prerequisite:* A course in the principles of economics.

7-560. Modern Economic Thought (1960–61 and alternate years)

Spring, 3 credits — BUSHROD W. ALLIN and JAMES P. CAVIN

The purpose of this course is to help the student trace the roots of modern economic thought to such representative economists of the past 50 years as: Alfred Marshall, Edward Chamberlain, Wesley C. Mitchell, John M. Keynes, John M. Clark, Joseph Schumpeter, John R. Commons, and Thorstein Veblen. Prescribed readings include Mitchell's *Lectures* and Galbraith's *The Affluent Society*. *Prerequisite:* A course in the principles of economics.

7-570. Statistical Analysis Applied to Economic Problems (1960–61 and alternate years)

Year, 2 credits each semester — MARTIN J. GERRA

The first semester deals mainly with analytical tools for measuring demand, using the single-equation approach. Emphasis is placed on the cases for which single equations appear to be valid, the statistical requirements that must be met if the method of least-squares is to be used, other statistical considerations involved in setting up the analysis, and the interpretation of results. The first half of the second semester is devoted to an introduction to the use of simultaneous equations in demand analysis, with application to the analysis of relations between competing and complementary commodities. Other topics depend on the interest of students: they might include spatial-equilibrium analysis and linear programming, endogenous mechanisms and the cob-web theorem, analysis of family budget data, sector analysis, or methods of studying effects of alternative government programs. *Prerequisite:* Principles of Economics, a course in statistics that included multiple regression analysis, and a working knowledge of elementary algebra.

7-800. Research Methods in Social Sciences (*See* p. 92)

8-699. Economy of Highway Improvements (*See* p. 96)

PERSONAL ECONOMICS

COMMITTEE

BUSHROD W. ALLIN (Chairman)

JAMES P. CAVIN — KENNETH E. OGREN
NATHAN M. KOFFSKY — FREDERICK D. STOCKER
WILLIAM A. VOGELY

Occasionally Government employees request the Graduate School to offer courses in which they are particularly interested,

but that are not of an academic nature. When such requests are approved, the courses are offered, as in this section, sometimes without academic credit.

7-2. The How and Why of Stock Investments

Fall, non-credit — Robert M. Gelman

A basic survey course designed to teach the investor the fundamental principles of investing in our modern securities markets. All aspects of stock market operations are discussed. Investment decision-making is the main objective. The broader aspects of the operations of brokerage firms and members of the New York Stock Exchange are correlated with what the investor should know about the internal operations of the stock market. Films are used to supplement the lectures.

7-135. Family Investment and Finance

Fall, 2 credits — Harold B. Rowe

Interests of students who may be concerned with financial planning and management for their own families have been considered in planning this introductory course. Elements of a modern approach to general economics analysis are studied in terms of their application in major decisions to be made during the life cycle of a family. Advanced, although only moderately technical, methods are developed for analysis. The financial situations of families viewed as primary owning units. Chief attention is focused upon decisions with respect to choice and timing of investments in relation to appropriate financial goals, but interdependence with other spending and credit decisions is emphasized especially. Relationship to uncertainty and risk. In short, the course is concerned with a range of family decisions as to what, when, and how to own and to owe.

Agricultural Economics

COMMITTEE

Bennett S. White, Jr. (Chairman)

Philip F. Aylesworth	Joseph Knapp, Jr.
Kenneth L. Bachman	O. L. Mimms
John O. Gerald	Robert M. Walsh
Horace R. Josephson	Everett C. Weitzell

The great importance of enlarging and improving knowledge of the economics of agriculture is generally recognized. Constructive accomplishment in this field requires thorough training in economics combined with a comprehensive grasp of its application to the special conditions of agriculture.

The shortage of well-trained marketing personnel, at both Federal and State levels, critically handicaps developing a well-rounded program under the Agricultural Research and Marketing Act. The greatest immediate need is for men with advanced training who can undertake independent work in new fields. The broad expansion of activities scheduled under the Act also will continue and intensify the need for adequately prepared college graduates. On both

problems, the Department of Agriculture is cooperating closely with the land-grant institutions. Joint committees have analyzed and mapped out an attack on these problems. As part of this plan, the Graduate School has given special advanced training to Washington personnel engaged in marketing work, and regularly offers both introductory and advanced courses in this field.

Upon request, arrangements can probably be made to take any of the following courses as reading courses whenever there is insufficient enrollment for a regular class. Students who are interested in such an arrangement should consult the Registrar.

7-212. Rural Community (*See* p. 89)

[7-203.] **Introduction to Marketing** (1961–62 and alternate years)

Fall, 3 credits BENNETT S. WHITE, JR.

A preliminary course intended to provide orientation for the study of marketing as (1) a type of production that supplies essential services, and (2) a valuation process in which the prices of agricultural commodities are established. Marketing machinery costs, functions, methods and practices are surveyed. Marketing specialists of the Department of Agriculture will lead discussions relating to particular commodities and special problems. *Prerequisite:* A basic course in economics.

7-409. Farm Management (1960–61 and alternate years)

Spring, 2 credits WYLIE D. GOODSELL and ORLIN J. SCOVILLE

An advanced course in farm organization and management that combines development of economic principles of farm production with practical application to the planning and operation of farms of different types, sizes, and locations. The practical and theoretical aspects of purchasing, organizing, operating, and managing farms are treated. Consideration is given also to economic adjustments needed in specific farming areas and for the nation.

7-414. Economics of Marketing (1960–61 and alternate years)

Year, 2 credits each semester HAROLD F. BREIMYER and HARRY C. TRELOGAN

An advanced course in which economic aspects of marketing agricultural commodities are systematically analyzed, with main emphasis on applying modern economic concepts to the successive problem areas developed. The first semester concerns marketing, including transportation, storage, processing, and distribution, as a productive process. It explores the use of resources in this process, the effects of market institutions and organizations upon the use of resources and the productive services performed, and the criteria of efficiency of this productive process and of public policy designed to improve it. The second semester considers the market as a mechanism for establishing prices. It explores the functions of market prices, the process of price-making, the effects of market organization and practices, and the relationships between margins and the costs of productive services in marketing, and the criteria of efficiency in price-making and of public measures that regulate or intervene in the price-making process. *Prerequisite:* Principles of Economics and Introduction to Marketing, or the equivalent as approved by the instructor.

7-457. Economics of Agricultural Development

Year, 3 credits each semester — Raymond P. Christensen

A survey course in the economics of agriculture, with special emphasis on the role of agriculture in national economic growth. The first semester deals mainly with principles and elementary tools of economic analysis applicable to agricultural production and marketing problems and with the effects of technological improvements, institutional arrangements, and other factors affecting economic progress in agriculture. The second semester considers in greater detail the identification of economic problems in agriculture and the development of effective research procedures for use in analysis of these problems. Emphasis is placed upon the application and adaptation of research methods used in the United States to economic problems of agricultural development in foreign countries. The course is designed primarily for foreign students.

[7-459.] Economics of Market Expansion (1961–62 and alternate years)

Fall, 2 credits — Robert M. Walsh and Associates

General factors affecting market growth in developed and developing countries; differential rates of expansion by commodities and services in the United States; role of technology and social innovation, monetary and fiscal policy, labor, product innovation, and promotion; social factors affecting productivity; expanding markets through public programs; factors affecting foreign market expansion; regional economics; and forecasting future growth. *Prerequisite:* Principles of Economics.

7-473. Economics of Structural Change in Production and Marketing

Fall, 2 credits — Raymond P. Christensen and Winn F. Finner

Major emphasis on agricultural-industrial relationships in their broadest sense, including review of production principles applicable to marketing and processing as well as farming, impacts of recent increases in contract farming and other forms of integration in the various stages of marketing and production that affect decision-making, financing, technological development, operation of the pricing system, and competitive position of different kinds of firms.

[7-575.] Agricultural Prices (1961–62 and alternate years)

Fall, 2 credits — Harold F. Breimyer

The role of prices in the farm economy and an introduction to price analysis and to the economics of farm price policy. The course outlines the influences on farm product prices such as business conditions, consumer incomes, transportation rates, methods of marketing, and differences in variety, grade and quality. It is designed to help in an understanding of farm programs, and in application of research methods to the farm price area. Discussion of trends, seasonal variations, and cycles in agricultural prices, and their analyses. A survey of available information about the effects of price changes on the consumption and production of farm products. *Prerequisite:* An elementary course in statistics and one in economics.

[7-716.] Agricultural Policies and Programs—Seminar (1961–62 and alternate years)

Spring, 2 credits — Oris V. Wells

Analysis and evaluation of current agricultural policies and programs with special reference to planning and programming techniques and processes, including a review of policy and program development from World War I to date. Agricultural policies and programs will be considered in relation to economic

principles as well as the chief trends or forces operating within the national economy as a whole. An effort will be made to consider all the main streams of agricultural policy, including problems relating to research and education, marketing, and land use and conservation, as well as farm price supports. *Prerequisite:* A college degree in agriculture or a related field with some courses in economics, or operational responsibility in agricultural programs.

[7-719.] Resource Economics—Seminar (1961–62 and alternate years)

Spring, 3 credits MARK M. REGAN

Practices and problems in the economic analysis of land and water resource programs. Study of prevailing and proposed practices for project formulation, economic justification, and cost sharing. Analysts and administrators of various resource agencies participate in discussions of their special fields. *Prerequisite:* Graduate work in agricultural economics, or the consent of the instructor.

[7-722.] Marketing—Seminar (1961–62 and alternate years)

Spring, 2 credits HARRY C. TRELOGAN

A seminar for advanced students interested in current research and service developments. Selected projects are reviewed to indicate newer research techniques and service methods used in agricultural marketing. Projects are examined in terms of background need for the work, objectives of the activities, and relationships to other phases of a general program of marketing research. Economic, statistical and management problems involving market costs, quality, organization, and information are featured in the material selected for analytical review. A term paper on a related topic will be required for credit. *Prerequisite:* Courses in elementary economics and statistics and advanced courses or responsible experience in marketing.

8-409. Airphoto Analysis in Agriculture (*See* p. 100)

7-800. Research Methods in Social Sciences (*See* p. 92)

COOPERATIVE EXTENSION EDUCATION

COMMITTEE

MARY L. COLLINGS (Chairman)

HARLAN COPELAND
GEORGE H. ENFIELD
G. G. GIBSON
CANNON C. HEARNE
ALICE C. LINN
MARY F. LYLE
JOSEPH L. MATTHEWS
WARD F. PORTER, JR.
KENNETH F. WARNER

Cooperative extension education consists of the off-campus, nonresident teaching service of the land-grant institutions in cooperation with the USDA and the leadership of a county. It is the largest non-school educational program in the United States. The growing interest, on the part of county agents, supervisors, specialists, and training personnel, in advanced study under the guidance of the Federal extension staff has led the Graduate School to appoint a committee on Cooperative Extension Education. This committee

has the responsibility for giving guidance to students toward a program best suited to the individual's needs, within the framework of the Graduate School. This program may well lead to an advanced degree depending upon the plans of the student and the cooperative arrangements with local educational institutions and the Graduate School.

The following courses are given as the demand justifies:

7-535. Methods of Evaluating Educational Programs

Fall, 3 credits — Members of Staff of Extension Research and Training Division, Federal Extension Service

Clarification of objectives, data collection, sampling procedures, analysis, interpretation, presentation, and use of data. The course is especially adapted to evaluation of extension programs. It is not the intention to make a "studies expert" of each student, but to give a broad concept of methods of systematically appraising work and programs. *Prerequisite:* Experience as a professional extension worker, or the consent of the instructors.

7-596. Development of Extension Programs

Fall, 3 credits — Members of Staff of Extension Research and Training Division, Federal Extension Service

A systematic study of methods of developing voluntary county educational programs, including sources of essential basic information; the role of lay people and of supervisors, specialists, and county workers; use of planning committees; step-by-step procedures; coordinated county plans; and characteristics of good programs. Special reference will be made to Extension programs, but principles and procedures are applicable to all voluntary educational programs.

7-732. Four-H Club Programs—Seminar

Spring, 3 credits — E. W. Aiton and Staff, Division 4-H Clubs and YMW Programs

Major emphasis is on objectives and principles for planning effective educational programs for rural young people. Development of volunteer local leadership, advisory and sponsoring groups, developmental needs of young people, and changing aspects of community life are major topics for consideration. Class periods are devoted to presentations, discussions, and individual papers by the instructors and students. Opportunity can be provided for special problems to be developed by individual class members. *Prerequisite:* A course in principles of 4-H Club programs, but suitable professional experience may be substituted on arrangement with the instructors.

Human Relations

COMMITTEE

John M. Brewster (Chairman)

John A. Clausen
Forrest E. Clements
Joseph Green, Jr.
Margaret J. Hagood
James O. Howard
Franklin E. Kilpatrick
Conrad F. Taeuber
Carl C. Taylor

Courses in human relations are planned to meet the needs of four types of students: (1) those who wish a general rather than

specialized knowledge of social problems and processes; (2) those who wish substantial first undergraduate courses in sociology and psychology; (3) those who wish specialized undergraduate and graduate courses in these same fields; and (4) mature persons who wish courses that use the knowledge of all social sciences in considering public issues and policy.

7-210. General Psychology

Fall, 3 credits. Repeated in Spring — Richard S. Fitzpatrick

Psychological theory and principles, based on experimental fact and observation, and interpretation of human relations that begin with the development and capabilities of the human personality. Adjustment of the personality to environment. Lack of proper adjustment and the resulting varying degrees of mental illness calling for psychotherapy. How man sees his world; what influences his relations with his environment and examination of these relations in selected human situations: marriage, job, and such problem areas as delinquency, crime, and addiction. Students take a selected group of psychological tests during the course.

7-212. Rural Community

Fall, 2 credits — Edward V. Pope

Impact of population shifts; great diversity and heterogeneity of the rural population; changes in the structure of farming with more specialization and increased mechanization; changes in community institutions and services and in transportation and communication. These subjects are considered in light of the rapid economic and social changes taking place in the rural community, with special emphasis on the need of agencies responsible for administering programs to better understand the present-day rural community in order to adjust their approach in carrying out their responsibilities.

7-303. Child and Adolescent Psychology (1960–61 and alternate years)

Spring, 2 credits — Eugene Stammeyer

Study of the development of human behavior from the prenatal period through adolescence in terms of the processes of physical, mental, emotional, and social growth in the individual. Particular emphasis will be given to the interactions of the child's total personality.

7-304. The Conditions of Personality Growth (1960–61 and alternate years)

Fall, 2 credits — Eugene Stammeyer

The principal factors influencing personality development: physiological bases, early experiences, and cultural determinants. The course considers both experimental and clinical contributions to the study of personality and their application to practical problems of understanding and dealing with people.

7-400. General Semantics

Fall, 2 credits — Frank R. Eldridge

How we detect meaning, evaluate it, and communicate it to others. How we may become more perceptive as observers, more effective as evaluators, and more explicit as communicators. The course offers devices for realizing how we react to language, how we evaluate it, and how we use it to communicate. It

studies the mechanisms that cause confusion of meaning and how we obtain clarification by an understanding of useful devices and theories applied as tools of analysis, evaluation, and communication.

7-440. Psychology as the Modern Study of Man

Spring, 2 credits — Giorgio Tagliacozzo

The numerous ramifications and associations of contemporary psychology are surveyed systematically within the framework of modern knowledge. The course examines the theoretical aspects, the applications, and the relationships of psychology with other disciplines and fields of modern knowledge. It tends to unify the thinking of the student about the place of man in the mid-twentieth century. The following basic features serve as guidelines: (1) freedom absolutes; (2) space-time; (3) discontinuity-uncertainty; (4) the "unconscious"; (5) Gestalt and field; and (6) the trend toward integration.

7-442. Personality Disorders (1960–61 and alternate years)

Spring, 2 credits — Albert C. Cornsweet

This course through lectures and case discussion deals with personality variations as seen among normal people, stressing the significance of such variation in social and occupational adjustment, and with major types of abnormal personalities with emphasis on recognition of these deviations. Designed to help meet the needs of placement officers, counselors and others who through interviews or other media must recognize and deal with problems of emotional maladjustment. *Prerequisite:* A course in general psychology, or the equivalent.

7-482. Social Psychology of Communication (1960–61 and alternate years)

Fall, 2 credits — Richard S. Fitzpatrick

Interpretation of communication research studies in light of social psychological theory. Analysis of social psychological theory for insight into communication habits and impact. Study of the social psychology of perception, value, leisure time, and cultural differences as they affect communications by mass media. Learning theory and educational level as they affect communication behavior. Communication behavior in selected cultures. Social psychological bases for opinion formation and implications of opinion shifts and changes. Analysis of communication systems and data for research purposes. Constructing a theory of the social psychology of mass media. *Prerequisite:* Permission of the instructor.

7-490. Marriage and the Family

Fall, 2 credits — Earl F. Hodges

The family as a primary social unit; development, resources, and problems.

[7-533.] Research Methods in Human Relations (1961–62 and alternate years)

Fall, 2 credits — Richard S. Fitzpatrick and Verma R. Langley

Acquaints the student with the techniques available to solve problems involving human relations in an organizational setting by standard research methods. Students are required to identify problems, show how they have been studied in the past and suggest new or modified approaches for investigating them. Includes systematic examination and appraisal of surveys (extensive, intensive, and informal interviews), scales, projective techniques, pencil and paper tests, observational techniques, re-analysis of existing data, field and laboratory experiments. *Prerequisite:* Courses in sociology and psychology.

7-538. World Population Trends and Problems

Spring, 3 credits — Jacob S. Siegel

General introduction with emphasis on population trends and prospects in the United States as compared with other areas of the world. Malthusian and subsequent theories of population growth. History of growth and distribution of the world's population. Trends in fertility, mortality, and migration, and their analysis in relation to social, biological, psychological, and, especially, economic factors. Relation of population growth to economic development and resources; concept of optimum population. Aesthetic considerations in population growth. Development of national population policies. Population prospects in the United States and other countries. Implications for international relations. *Prerequisites:* Some previous training in the social sciences and statistics.

7-541. Improving Human Relations and Group Behavior

Fall, 2 credits. Repeated in Spring — Carl F. Bauer

Concerned with the importance of recovering personal identity and responsibility in our mass civilization. An organic experience of the organized materials of the course through practice in the methods, techniques, and skills of "Group Dynamics." Among the methods and techniques used are the team method of training leaders, face-to-face analysis, free association, non-directive and developmental discussion, problem census, group decision method, informality, and interviewing.

6-453. Human Relations in Administration (*See* p. 67)

7-542. Russia: Yesterday, Today, and Tomorrow

Fall, 2 credits — Anthony F. Czajkowski

Political, economic, social, and ideological forces in the history of Russia, influencing her current policies.

7-625. Law and Government Behind the Iron Curtain

Fall, 2 credits — Armins Rusis

Origin and characteristics of legal systems in the Soviet Union and the satellite countries. Underlying ideology. Take-over of power. Concept of law and legislative techniques. Government and the Party. Ownership and nationalization. System of economy. Worker and factory. Land and peasant; collectivization. Courts, public prosecutors, lawyers. Criminal law and procedure. Civil codes and civil procedure. Church and State. Personal rights and freedoms. Position of Communist governments with respect to international law. Recent legislation. *Prerequisite:* Graduate standing in law or political science, or the consent of the instructor.

7-701. Seminar on Psychological Literature

Spring, 3 credits — Richard S. Fitzpatrick

A seminar based on seven books in psychology, including those of Freud, Jung, Lindner, and others that are available in paperbound editions. The course is intended for advanced students, teachers, and personnel and counseling psychologists who want to evaluate motivational factors in everyday situations, utilizing a new look at psychological theory. *Prerequisites:* Bachelor's degree, courses in psychology, or appropriate experience and the consent of the instructor.

7-600. Readings and Papers in Human Relations

Fall, 3 credits. Repeated in Spring RICHARD S. FITZPATRICK, Coordinator

Under the guidance of a social scientist, supervised readings with monthly conferences on topics in an area of interest to the student, or individual research and a paper on a problem in human relations. Readings or the problem to be investigated are determined in consultation with an advisor. *Prerequisite:* Bachelor's degree, or the consent of the coordinator.

7-800. Research Methods in Social Sciences

Fall, 2 credits

HARRY C. TRELOGAN
FREDERICK V. WAUGH
SHERMAN E. JOHNSON

Seminar on development, purpose, and methods of science. Comparisons with natural sciences and relationships between disciplines will be discussed to show how logic, mathematics, and research methods drawn from different sources bear on research techniques employed in social sciences. Discussion will be led by leaders in agricultural research including, but not confined to, those listed above who may be contacted for further information. *Prerequisites:* Graduate training or responsible experience in research and current occupancy of a position entailing research responsibilities.

6-250. American History to 1865 (*See* p. 68)

6-251. American History Since 1865 (*See* p. 68)

Technology

DEPARTMENTAL COMMITTEE

J. P. SCHAENZER (Chairman)

EVAN L. FLORY
ROWLAND LYON
ELBRIDGE C. PURDY
HENRY A. SAWCHUK
G. C. TEWINKEL
ROBLEY WINFREY

—o—

Various departments and agencies of the Federal Government are engaged in programs such as flood control, soil conservation, power development, mapping, and rural electrification, which involve in varying degrees engineering techniques and professional engineers. They include many functions that require a working knowledge of techniques not provided in the standard engineering courses.

Basically, education in engineering schools is limited by necessity and tradition to a period of four or five years. This short period of training provides sufficient time to assimilate and master only a minimum of the basic sciences. There is little time available for courses that will give the technical student an understanding of the social and economic problems of the world about him. As a result, he fails often to appreciate the impact upon society of the advances of his profession. Moreover, technological techniques and practices are never static, and developments in the sciences and in engineering require enlarging and constant reorienting of the engineer's technical background.

The Graduate School, working with representatives of the various Government departments and agencies and of the local chapters of engineering societies, offers courses designed to add to the technical, professional, and administrative background of engineers in the service of the Federal Government. Many courses offered provide training in the latest techniques that colleges and technical institutes often cannot provide.

—o—

ENGINEERING

COMMITTEE

HENRY A. SAWCHUK (Chairman)

J. H. GEHRING
FERDINAND KAUFHOLZ
S. D. KEIM
E. J. PETERSON
WILLIAM D. POTTER
JOHN H. RIXSE, JR.
F. F. SNYDER

If there is sufficient demand, courses similar to the Electrical Engineering Review for P. E. Examination will be given in other engineering fields for students who wish to review for the D. C. Professional Examinations.

8-92. Review of Engineering Fundamentals for P. E. Examination

Fall, non-credit. Repeated in Spring — John H. Rixse, Jr.

A general refresher course in basic sciences and engineering principles intended to assist in preparation for the basic portions of the District of Columbia Professional Engineer's License Examination (not specific branches of engineering). Covers elements of strength of materials, structures, fluid mechanics, mechanical engineering, electrical engineering and engineering economics. *Prerequisite:* Preferred, those qualified to take the P. E. examination.

8-95. Electrical Engineering Review for P.E. Examination

Fall, non-credit. Repeated in Spring

J. J. A. Jessel
Almon D. Thomas
Louis M. Tierney

A refresher course for persons who are preparing for the D. C. Professional Engineer's License Examination in the field of electrical engineering with emphasis on power. Solutions of practical problems. *Prerequisite:* Preferred, those who are qualified to take the examination.

8-110. Principles of Electricity

Spring, 2 credits — David Askegaard

Principles of electricity, emphasizing alternating currents. Covers basic units such as voltage, current and power and their measurement, resistance, voltage regulation, line loss, power factor, three phase systems, etc. The function of equipment used on rural electric distribution systems such as generators, substations, transformers, lightning arrestors, fuses, oil circuit reclosers, etc., will be emphasized.

8-119. Jet Turbo Prop and Rocket Power Plants

Fall, 2 credits — William H. Cullin

Introduction to the theory and principles of operation of jet aircraft propulsion systems and their components. Simple calculation related to the theory and operation of jet propulsion systems. An appreciation of the problems and limitations of these systems as well as their future. *Prerequisite:* High school algebra and plane geometry are desirable.

8-405 Principles of Specifications

Fall, 2 credits — Benjamin Rosenzweig

A basic course in the principles underlying the government specifications systems. A brief survey will be made of procurement documents and the purposes they serve. The organization of specifications for form, clarity, and effectiveness will be demonstrated. The evolution and ramifications of specifications will be considered with regard to research and development; legal and contractual relations; proprietary items; and government inspection. The division of specifications into performance and formulation types will be reviewed. The problems of standardization and industry coordination will be discussed. *Prerequisite:* Knowledge of procurement, inspection, research and development processes, or specification writing.

8-115. Practical Radio and Television

Year, 3 credits each semester — Robert Hauptman

A lecture-demonstration course covering the practical aspects of radio, television, and allied subjects. The use of mathematics is held to a minimum, and the basic studies are undertaken in a simple descriptive manner. The first semester deals with electronics fundamentals, amplifiers, and radio receivers. Specific topics include: principles of electronics and radio; electronic components; DC and AC circuit characteristics and analysis; electron tubes; amplifiers; radio receiver fundamentals and applications. The second semester deals with radio transmitters, FM, TV, and miscellaneous subjects. Specific topics include: radio frequency regeneration; radio transmitter fundamentals and applications; fundamentals and applications of frequency modulation and television; propagation, radiation, and antennas; sources of power; test equipment.

This is not a laboratory class. An electronics demonstrator is used in class. Purchase of a radio kit is optional with the student. *Prerequisite:* A general knowledge of algebra and physics of at least high-school level.

8-465. Applied Electronic Theory

Year, 2 credits each semester — John J. Cullinane, H. Walter Price

General principles of electronics; basic characteristics of resistance, capacitance, and inductance taken singly and in combination; practical basic components; elementary circuit analysis particularly as it pertains to series and parallel resonance; circuits with distributed constants; generation and propagation of radio waves; fundamental principles of electron tubes including diodes, triodes, and pentodes; voltage amplification.

The second semester is a continuation and elaboration of subjects undertaken in the first semester: Class A, B and C power amplification; rectifiers and power supplies; sine-wave oscillators; amplitude modulation and detection; frequency modulation; transmitters; receivers including the superheterodyne; basic pulse circuits; fundamentals of television; theory and use of test equipment.

This is an intermediate level course stressing how electronic circuits work. Elementary complex notation will be introduced and extensively used. *Prerequisite:* Physics, algebra, trigonometry, DC electricity, AC electricity, or consent of the instructor. A knowledge of elementary calculus is helpful but not necessary.

8-525. Transistor Electronics

Fall, 3 credits — Albert M. Rubenstein

An introduction to semiconductor principles, point contact transistors, junction transistor, p-n-p and n-p-n transistor characteristics, transistors as low and high frequencies circuit elements, transistor amplifiers and oscillators, measurement of small signal parameters (alpha, a and b), cascade amplifiers, noise in transistors, compensation for temperature variation, equivalent network circuits, and other related topics. *Prerequisite:* Bachelor's degree in physics or electrical engineering, or equivalent professional experience.

8-690. Nuclear Reactors

Fall, 2 credits — Fred Schulman

Consideration of reactor physics, radiation, types of reactors, elementary design considerations, and properties of materials related to reactor technology. *Prerequisite:* B.S. degree in physics, engineering, or chemistry, or the consent of the instructors.

8-695. Engineering Reliability

Year, 2 credits each semester — H. Walter Price

A general course in the new field of engineering reliability. Nature and philosophy. Probability and statistics pertaining to reliability; failure and survival distributions; mean time to failure; failure rates; design-of-experiment techniques; operations-research techniques. Stress domains; the effects of temperature, shock, vibration, humidity, and electrical stresses. Systems reliability; probabilistic environmental considerations; probabilistic use situations. Design reliability; designing for reliability under specific environmental stresses; logical determination of tolerances; incorporation of safety margins in the design; role of specifications in reliability. Design evaluation techniques; specification reliability analysis; component reliability evaluation; circuit reliability analysis; the Probe Test. Manufacturing reliability; effects of the fabrication process; role of quality control. End-use reliability; effects of storage, handling, and maintenance procedure. Various mechanical models and games will illustrate statistical concepts. Simulated reliability problems will be solved by the students as a group. Specific reliability problems submitted by students will be discussed. *Prerequisite:* Engineering degree, or the consent of the instructor.

8-697. Location and Design of Rural Highways

Fall, 3 credits — Forest H. Green

Basic principles of rural highway location, including the recognition of topographic and cultural influences and the application of road-use analyses. Use of air-photo interpretation methods, photogrammetry, and ground-reconnaissance surveys. Development of curvilinear alignments. Development and general application of geometric design standards, with special emphasis on freeway design.

8-698. Highway Location and Design in Urban Areas

Spring, 3 credits — Forest H. Green

Location of new highway facilities in urban areas. Geometric design of intersections at grade. Location and design of freeways, including the selection and design of various types of interchanges.

8-699. Economy of Highway Improvements

Fall, 3 credits — Robley Winfrey

Principles of engineering economy applied to highway facilities; benefits from highways and cost of highways; estimating needs for highway improvements; scheduling annual construction programs and priorities of projects; and the financing of highway improvements. This course is designed for the highway engineer, transportation economist, or other person having a reasonable working knowledge of the requirement, operations, and policies of highway departments and agencies, and of the economic considerations involved therein. One of its aims is to bring into proper relationship engineering, economics, and financing as they focus upon highway transportation plans and policies. *Prerequisite:* B.S. degree in engineering, economics, or business administration.

Surveying and Mapping

COMMITTEE

G. C. Tewinkel (Chairman)

D. A. Bucci
Walter Dix
Cecil Ellingwood
Randall D. Esten
George H. Everett
James P. Fondren
S. J. Friedman
Otto Gutenson
J. E. King
Robert H. Randall, Jr.

Maps have played an important part in human progress. Today, as never before, they furnish the basis for both military and non-military activities throughout the world. Greater use of maps has brought increasing demand for persons qualified in each of the technical phases of map production and reproduction.

The purpose of the curriculum in surveying and mapping is to offer basic training for those persons who are engaged in the technical and supervisory aspects of map making. The curriculum is intended to give the student a broad knowledge and basic understanding of each of the separate phases of the science; to enable him to understand better the problems, possibilities, and limitations of each of the phases. He can then better plan his own activities toward the economical production of accurate maps. A large part of the curriculum is devoted to geodesy, a subject considered to be of increasing importance in view of modern rapid means of world-wide travel, the consequent need for world-wide charts, and the development of new methods in surveying.

Certificates of Accomplishment in Surveying and Mapping

Certified Statements of Accomplishment in Surveying and Mapping are granted to students who have completed organized courses of study intended to provide basic training for responsible surveying and mapping work. The background required is not necessarily a college degree, but accomplishment of the work leading to the Undergraduate Certificate provides training approximately equivalent to that gained from a year of technical college work. The student completing the courses leading to the Advanced Certificate has acquired technical knowledge at least at the level of the Master's Degree. While neither certificate requires entrance backgrounds of any specified level of college education, the student is reminded that completion of courses in the broader, non-technical subjects that are integral to the standard college curriculum is an important part of his general preparation for responsible work in his chosen profession.

Undergraduate Certificate

Requirements

1. High school graduation. Students should file with the Graduate School, before completion of their certificate program, a transcript of their high school or college record.
2. Thirty semester hours of credit with grades of "C" or better in courses as outlined below.
   (a) Prerequisites: College algebra and trigonometry
   (b) Required courses: (22 credits)

8-135.	Elementary Surveying (3)	8-222.	Mathematics for Cartographers (2)
8-204.	Topographic Surveying (3)	8-223.	Map Projections and Grid Systems (3)
8-251.	Photogrammetry I (3)	8-240.	Cartographic Techniques and Map Reproduction (2)
8-252.	Photogrammetry II (3)		
8-208.	Aerial Photographic Interpretation (3)		

   (c) Related Electives: At least eight hours of credit in courses selected from the related electives listed below.

Advanced Certificate

Requirements

1. High school graduation. Students should file with the Graduate School, before completion of their certificate program, a transcript of their high school or college record.
2. Thirty semester hours of credit with grades of "B" or better in courses as outlined below.
   (a) Prerequisites: College algebra, trigonometry, analytic geometry, and calculus.
   (b) Required courses: (21 credits)

8-217.	Astronomy for Engineers (3)	8-424.	Large Scale Maps (2)
8-218.	Geodetic Surveying (3)	8-425.	Small Scale Maps (2)
8-219.	Computation and Adjustment of Geodetic Observations (3)	8-440.	Theory of Geodesy (3)
8-480.	Photogrammetry III (3)	2-226.	Official Writing or
		2-450.	Technical Writing (2)

   (c) Related electives: At least nine hours of credit in courses selected from the related electives listed below.

Related Electives—for both the Undergraduate and Advanced Certificates (17 hours if both certificates are taken)

8-215.	Route Surveying (3)	8-465.	Applied Electronic Theory (4)
8-408.	Advanced Aerial Photographic Interpretation (3)		or
8-203.	General Geology (3)	8-115.	Fundamentals of Radio and Television (6)
5-204.	Historical Geology (3)	2-226.	Official Writing (Undergraduate only) (2)
3-508.	Theory of Errors (3)	5-360.	General Oceanography (3)
5-326.	General Meteorology (3)		

Equivalent courses are accepted by transcript from other institutions to meet a part of the certificate requirements. Students who wish to use credit earned elsewhere should arrange for the transcript to be sent to the Registrar at the beginning of their program.

Students who began work toward the certificate before September, 1956, may follow the requirements outlined in the 1955–56 catalog.

—o—

Surveying

[8-135.] Elementary Surveying (1962–63 and every third year)

Fall, 3 credits — Cecil Ellingwood

Use of the transit, level, compass and accessory equipment; adjustment of instruments; field methods of transit-and-tape traverse and engineers' leveling (differential and profile); computations connected with above including adjustment of traverses by compass and transit rules, computation of latitudes, departures, and areas. Lectures, classroom work, and field work. *Prerequisite:* Plane trigonometry.

[8-204.] Ground Methods of Topographic Surveying (1962–63 and every third year)

Spring, 3 credits — Cecil Ellingwood

Transit and stadia; plane table and stadia; approximate methods, special methods for peculiar conditions; Beaman stadia arc; Baldwin solar chart, etc. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

8-215. Route Surveying (1960–61 and every third year)

Fall, 3 credits — Cecil Ellingwood

Theory and practice of surveying for railroads, highways, canals; preliminary and location surveys, cross sections, earthwork quantities and transition spirals. Lectures, classroom work, and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

8-217. Astronomy for Engineers (1960–61 and every third year)

Spring, 3 credits — Cecil Ellingwood

The fundamentals of the circular systems; basis of the determination of time, longitude, latitude, and azimuth; and the use of instrumental equipment. *Prerequisite:* Elementary Surveying.

[8-218.] Geodetic Surveying (1961–62 and every third year)

Fall, 3 credits — Cecil Ellingwood

Theory and practice of first- and second-order triangulation, traverse, leveling; use of base-line equipment, repeating and direction theodolites, geodetic leveling equipment; field computations necessary to insure accuracy of observations. *Prerequisite:* Elementary Surveying or permission of the instructor.

[8-219.] Computation and Adjustment of Geodetic Observations (1961–62 and every third year)

Spring, 3 credits — Cecil Ellingwood

The office procedures in final computation and adjustment of field observations introduced in Course 8-218; least square approach to the adjustment of networks of traverse and leveling and simple triangulation figures. *Prerequisite:* Course 8-218, or the equivalent, or permission of the instructor.

8-421. Principles of Hydrography (1960–61 and every third year)

Fall, 2 credits — William A. Foster

Fundamentals of hydrography: lectures and discussion on hydrographic surveying operations, including instrumentation, organization, techniques, and specifications; demonstrations and practice in office phases, including boat sheet and smooth sheet; bathymetry; tides and currents; and wire drag operations.

8-440. Theory of Geodesy

Fall, 3 credits — Paul D. Thomas

Conventional triangulation; trilateration; leveling; base measurement and traverse; geodetic astronomy; intensity of gravity and figure of the earth; flare triangulation, star occultations, solar eclipses, and artificial satellites for geodetic measurements. *Prerequisites:* Differential and integral calculus. Desirable additional courses: analytic geometry of three dimensions, differential geometry of curves and surfaces, vector analysis, mechanics, and numerical analysis.

Photogrammetry

8-120. Introduction to Photogrammetry

Fall, 2 credits — S. J. Friedman

Lectures and demonstrations in non-technical terms cover: the history and development of photogrammetric engineering; the importance of optics; basic principles of photography; types of aerial photography, aerial cameras, accessory equipment, and photographic aircraft; requirements of coverage, flight lines, tilt, and scale; photo interpretation and stereoscopes; requirements of horizontal and vertical control; radial plot and stereoscopic plotting instruments. Designed for persons who use aerial photographs in military planning and operations, highway development, agricultural land use and conservation, mineral and petroleum exploration, and in other engineering and industrial operations.

8-208. Aerial Photographic Interpretation

Fall, 3 credits — Ethan D. Churchill

Principles, techniques, and applications of aerial photographic interpretation; history, concepts, types of aerial photographs, principles, techniques, and applications. Study, and use in various fields, of aerial photographs as a source of detailed natural and cultural information. *Prerequisite:* A general background in one of the following fields: surveying and mapping, cartography, geography, geology, forestry, agriculture, architecture, or allied engineering fields.

[8-408.] Advanced Aerial Photographic Interpretation (1961–62 and alternate years)

Spring, 3 credits — Ethan D. Churchill

A seminar on the application of aerial photographic interpretation to specialized technical fields, such as forest, range, and wildlife management; agricultural soil, engineering soil and vegetation surveys; geology and petroleum geology; population census in rural and urban areas, *etc.* *Prerequisite:* Basic training in aerial photographic interpretation. Training in forestry, range management, wildlife management, agriculture, ecology, geography, geology, or engineering desirable.

8-409. Airphoto Analysis in Agriculture

Spring, 3 credits — Henry W. Dill, Jr.

Principles, methods, and practices in airphoto interpretation to obtain data with reference to specific agricultural studies, including crop identification, land

and water utilization, agricultural trends, economic studies, farmland development and reversion, urban impact on agriculture and area resource surveys. Emphasis will be placed on use of extensive airphoto coverage available from the Department of Agriculture. Designed to give agricultural technicians a good working knowledge of airphoto analysis. *Prerequisites:* Background and training in agriculture are desirable.

8-251. Photogrammetry I

Fall, 3 credits — Otto Gutenson and Rupert Southard

Basic photogrammetric optics; basic geometric characteristics of aerial photographs; aerial cameras; photography and photographic material. Photographic scales and flight planning; radial line plotting methods; elevation determination; photo interpretation; mosaics. *Prerequisite:* College plane trigonometry.

8-252. Photogrammetry II

Spring, 3 credits — Otto Gutenson and Rupert Southard

Geometry of the tilted photograph; theory and use of oblique (tri-met) and horizontal photographs; rectification; theory and practice of the multiplex including equipment, orientation procedures, control, compilation, contours, bridging; stereoscopic plotting instruments. *Prerequisite:* Photogrammetry I as revised, or former courses, Photogrammetry I and II.

8-480. Photogrammetry III (1960–61 and alternate years)

Fall, 3 credits — G. C. Tewinkel, Charles E. Cook

Advanced theoretical details; compensation devices for lens distortion and other errors in photogrammetric operations; introduction to analytic bridging.

3-508. Theory of Errors (*See* p. 39)

Cartography

8-125. Introduction to Cartography

Spring, 2 credits — William A. Foster

An introduction to the broad field of cartography. The course covers general instruction in the history of maps; the shape of the earth; the fundamental concepts of the most common projections; the basic principles of plane and geodetic surveying, topography, hydrography, photogrammetry, and oceanography; the classification, evaluation, compilation, construction, and revision of maps and charts; methods and techniques of reproduction; and surveying with electronics.

8-240. Cartographic Techniques and Map Reproduction

Spring, 2 credits — M. S. A. Delaney

Factors, commensurate with the scale, that must be considered before a chart/map is designed for reproduction; selection of reproduction process; shaping of job for selected process; reproduction support during the compilation stage; types of line and half tone copy; types of media used for line, half tone and scribed originals; color separations; relief techniques; reproduction techniques utilized in correcting chart/map to date; cartographic typography; photolithography, letter press, gravure, ozalid, photogelatin processes, including historical background; demonstrations of cartographic and reproduction techniques utilized by the U. S. Navy Hydrographic Office, the Coast and Geodetic Survey, the Army Map Service, the U. S. Geological Survey, and the National Geographic Society, including the historical background; estimating man-hour costs. *Prerequisite:* Introductory Cartography, or the consent of the instructor.

8-222. Mathematics for Cartographers

Year, 2 credits each semester — George H. Everett

A study of spherical trigonometry and its useful applications to problems in cartography. The mathematical spheroid representing the surface of the earth is the model for which maps are planned and designed. An objective is to become familiar with the mathematical elements of the model and some of the procedures that have been developed for solutions of cartographic problems. The sphere can be considered a special case of a spheroid as the circle is a special case of an ellipse in the study of conic sections. In studying the basic principles applicable to the special case, ability can be acquired to apply the various developments and formulas for the general case.

First semester: Plane trigonometric principles and theorems with the plane triangle as a basic figure; spherical trigonometric principles; development of formulas for solutions of spherical triangles; computations of lengths of arcs; rectangular grids and polar coordinates; evaluation of a function by a series expression; arc-tangent and arc-sine differences. *Prerequisite:* College plane trigonometry.

Second semester: The terrestrial sphere and the geographic coordinate system; applications of spherical trigonometric formulas to problems involving the determination of distance, direction, and relative location on the sphere; the transformation triangle; examples expressing the law of a projection by rectangular coordinates; a graphical study of an ellipse; problems involving the arcs of a spheroid. *Prerequisite:* 8-222A, or college plane and spherical trigonometry.

8-223. Map Projections and Grid Systems

Spring, 2 credits — Edward W. Fonfara

Includes: basic principles with practical applications; computations; use of tables; layout; definitions; classifications; and characteristics. Identification of such standard projections as the polyconic, mercator, transverse mercator, Lambert conformal, gnomonic, and stereographic; and coordinate systems including rectangular, broad-area and true military grid.

This subject is presented from the practical viewpoint without the complex variable theory applications. *Prerequisite:* College trigonometry.

8-424. Large Scale Maps

Fall, 2 credits — Jacob Skop

Includes a review of the fundamental principles of cartography and the application of these principles with emphasis on large scale maps. Specific topics include: types and scales of maps; classification of the earth's features and their interpretation in symbolization; names; drainage, relief, woodland and vegetation, and other cultural features; foreshore and offshore hydrography; public land surveys; methods and procedures for making large scale maps; pre-compilation preparation; aerial photography; horizontal and vertical control; classification surveys; the compiler and his work; compilation; editing and field checking; color separation drafting; photolithographic reproduction; and military grids. *Prerequisite:* Map Projections and Grid Systems, or the equivalent.

8-425. Small Scale Maps

Spring, 2 credits — Robert B. Mercready

Factors to be considered in selecting the projection for the map, the scale, and the material for the compilation; drawing the map and preparing it for reproduction; compilation, reproduction, and use of the Army Map Service series of maps: the Nautical Chart Series including their compilation, reproduction, and application to navigation; the Aeronautical Chart Series including their compilation, reproduction, and application to air navigation. *Prerequisite:* Map Projections and Grid Systems, or the equivalent.

Fine and Applied Arts

COMMITTEE

Rowland Lyon (Chairman)

Sadye F. Adelson
O. A. de la Rosa
Howard B. Dominick
Martha L. Hensley
Garnet W. Jex
George E. Muth

Fine Arts

8-320. Pencil Sketching and Water Color Painting

Fall, 2 credits. Repeated in Spring and Summer — Rowland Lyon

An informal class in theory and practice. Students may use either or both media.

8-321. Life Sketching

Fall, 2 credits. Repeated in Spring — Duane A. McKenna

Sketching for practical skill and pleasure, using pencil and other media according to the needs of the individual student. Outside observations are part of the study, which, with field trips, supplement work from models. Special attention is given to nature and action drawing. Challenges are basic, but practicing artists find the course a valuable refresher.

8-322. Black and White Drawing for Reproduction (1960–61 and every third year)

Fall, 2 credits — Hugh J. Brown

Use of pen and brush in commercial graphics.

8-323. Portrait Painting in Oil

Fall, 2 credits. Repeated in Spring — Pietro Lazzari

To enjoy this course, the student need not have experience as an artist but must have the desire to achieve proficiency in portraiture.

Professional methods of painting oil portraits incorporating the basic techniques of the old masters and the spirit of modern art. Course includes sketching, line composition and light arrangement; color, theory, and technique of painting in oil. All work done from life.

[8-330.] The Grammar of Art: Drawing and Painting

Fall, 2 credits. Continued in Spring — Yuen Yuey Chinn

A foundation course leading to an understanding and appreciation of the use of line, shape, tone, texture, and color in creative drawing and painting. Through personal supervision at the instructor's studio, the student is guided in the elementary practice of drawing and painting. The course is continued in the spring, for new students and for those who wish to go on from the fall semester.

8-333. Survey of Art

Fall, 2 credits — Cora Lee C. Gillilland

The course aims to establish the basic values that underlie artistic achievement and to develop an appreciation of those values in painting, sculpture, and architecture. From age to age, these basic values—the aesthetic values—remain

the same. The lectures will attempt to relate the major epochs to one another so as to indicate the continuity of the history of art and at the same time to contrast the variant forces and ideas that produced differing styles and expressions.

8-334. Modern Painters

Spring, 2 credits — Cora Lee C. Gillilland

From David to Picasso. A survey course intended to give understanding and appreciation of Impressionism and Post-Impressionism.

8-335. Arts and Ideas: Western Europe

Fall, 3 credits. Repeated in Spring — Hanford M. Henderson

Especially designed to promote a deeper appreciation of a visit to Western Europe. Its cultural history is presented in a succession of style periods, centering on the principal art cities of England, France, Italy, and Spain.

Applied Arts

8-35. Introduction to Institutional Housekeeping

Fall, non-credit — Emma Morgan and Alta M. Ord

An introduction to the fundamentals of institutional housekeeping for hotels, hospitals, motels, college dormitories, fraternity and sorority houses, and similar institutions. The course will acquaint those interested in this field with the basic principles of the work. It should prove attractive to the woman planning another type of job when the younger generation is challenging her position. Field trips and demonstrations.

8-36. Institutional Housekeeping II

Spring. non-credit — Emma Morgan and Alta M. Ord

Further study of a rapidly expanding field. This course examines the rules and practices of the many varied duties of the Executive Housekeeper. It will better fit a person for work in the field. *Prerequisite:* Introduction to Institutional Housekeeping, or practical experience in the field.

8-55. Introduction to Interior Decoration

Fall, non-credit. Repeated in Spring — Margaret A. Steininger

Designed for persons who wish a nonprofessional knowledge of the principles of design and color to help them with their home decorating problems. Topics discussed include design, color furniture arrangement, floor and wall coverings, textiles, accessories, lighting, and setting up actual floor plans of rooms.

8-144. Graphic Arts in the Federal Government

Year, 2 credits each semester — Maurice Eysenburg and Garnet W. Jex

Introductory survey of the field of graphic arts in the Federal Government. Designed for practicing young artists and designers and for personnel concerned with visual presentation production, official uses of visual material, and information work. Introduction to the elements of visual communication, principles of good design applied to specific problems, and the practical use of the designer's and artist's tools and media as well as effective use of the product resulting from practical solution of visual problems. Demonstrations by experts. Lectures, exhibits, and color slides supplemented by discussion and analysis of home assignments.

8-284. Landscape Design of Small Property

Fall, 2 credits — Henry Schultheis

An introduction to the fundamentals of landscape design with particular emphasis upon the design of small properties. Includes principles of orientation, arrangement, and circulation.

8-285. Landscape Use of Trees, Shrubs, Vines, and Flowers

Spring, 2 credits — Henry Schultheis

A study of the principles and practices relating to site, planting, care and maintenance of ornamental trees and shrubs; care and maintenance of lawns and gardens.

Photography and Lithography

COMMITTEE

Elbridge C. Purdy (Chairman)

James A. Beales
Edward S. Cobb
Raymond Davis
Fred W. Gerretson
Julius Halsman
Joseph F. Hamm
R. J. Lefebvre
Keith B. Lewis
Albert R. Materazzi
Albert W. Matthews
Charles T. Myers, Jr.
Howland Pike
Ralph Williams

8-70. Popular Photography

Fall, non-credit. Repeated in Spring and Summer — William C. McHenry, Robert E. Shook

This is a lecture demonstration course of a nontechnical nature. It is intended particularly for those camera enthusiasts who desire a clearer understanding of how their cameras, films, and prints work. Better pictures should be the result of taking this course. Topics covered: camera types and operation; film types and uses; developing and printing; filters; exposure; planning, composition and lighting; portraiture; motion pictures; color photography. Exhibition and demonstration of equipment, materials and techniques supplement class lectures and discussion.

8-155. Fundamentals of Home Movie Making

Fall, 2 credits — Harrison F. Houghton

Designed to provide 8mm and 16mm beginners and experienced movie makers with basic techniques of producing story-telling films. Following an intensive review of rudiments of exposure, lighting, camera handling, use of tripod, editing, titling, and projection, primary emphasis will be on methods of pictorial continuity and the filming of a prepared script. Thorough treatment will be given to proper development of film sequences, using long-, medium-, close-up and angle shots; effective timing; controlled vs uncontrolled action, tying sequences together by transition shots, use of fades, dissolves, wipes, sub-titles, and other devices. Each student must complete a short story film.

8-156. Advanced Home Movie Making

Spring, 2 credits — Harrison F. Houghton

Extension of fundamentals course to cover techniques of preparing original scripts; the incorporation of story element in travel and documentary films; specialized filming, including bird photography. Will cover methods of re-

cording sound films with amateur equipment, including timing of sequences, proper selection of musical backgrounds and sound effect, preparation of commentary, use of dual turntables, tape recorders and magnetic sound projectors, etc. For course credit each student must complete a sound film. *Prerequisite:* Completion of Fundamentals course or equivalent.

8-161. Fundamentals of Lithography

Fall, 3 credits — Alexander Novak

Basic information on the principles of lithography and its operational procedures. Emphasis on their application to small-plant operations. Consideration of the function of equipment; basic theories involved in camera work, line, half-tone, color separations, negative copy preparation, composition, and layout; and evaluation of finished work in terms of correction of faults. Essential for the beginner, and a review for the journeyman.

8-165. Photocomposing I—Principles

Fall, 3 credits. Repeated in Spring — W. Howard Martin

This course is designed to acquaint the student with the fundamentals of good composition and layout, and the application of these principles to the paste-up of positives, using type from phototype setting equipment and the Fotosetter. An analysis of good and bad composition is made through the study of advertisements, photographs, and illustrations. Instruction is given in the use of drafting equipment and materials in the preparation of advertisements, ruled forms, and simple and complex booklets, using photographs, illustrations, and color overlays.

8-166. Photocomposing II—Practice

Fall, 3 credits. Repeated in Spring — Henry Dombrowski

This course furnishes laboratory instruction and practice in the fundamentals of basic photographic processes. Students prepare prints and negatives used in the paste-up class, photograph completed assignments, and opaque and engrave the final negatives. They are instructed in the stripping of halftone and line negatives, masking, surprinting, and register of negatives.

8-170. Survey of Lithography

Year, 3 credits each semester — Robert J. Lefebvre

Primarily for lithographic apprentices or those desiring an understanding of the whole lithographic process. In the first semester, through lectures and field trips to plants, the course covers the development of lithography; other printing processes and their relationship to lithography; offset photography, including color; plate making; layout and stripping. The second semester includes press work; copy preparation, cold and hot composition and photo typesetting; lithographic ink making and uses; offset papers, including a visit to a mill in Pennsylvania; binding; advantages and limitations of the process; future trends.

8-171. Stripping and Plate Making

Year, 3 credits each semester — Joseph F. Hamm

A workshop at the apprentice level. Film assembly and stripping on black and white work and color register work; color separation; false negatives; retouching and negative engraving. Includes all types of process plate making. *Prerequisite:* Survey of Lithography, of the consent of the instructor.

8-172. Presswork

Year, 3 credits each semester — Leo B. Krebs

Basic instruction in functions of rollers, damper systems, pressures, clearances, and other elements concerned with proper operation of offset lithographic presses. Emphasis on preparing and starting the presses. *Prerequisite:* Survey of Lithography, or the consent of the instructor.

8-174. Offset Photography

Year, 3 credits each semester — William J. Rankin

A workshop at the apprentice level. Contact and camera line and halftone negatives for photolithography; darkroom processing; contact and mechanical screens; filters and lens formulae. *Prerequisite:* Survey of Lithography, or the consent of the instructor.

8-175. Lithographic Estimating

Year, 2 credits each semester — Russell W. Clark

Basic and practical approach to analysis and procedures of cost estimating, with emphasis on cost-finding and its application to preparing estimates. Relationship of the estimate to customer and plant. Materials, new products, their use, and how they can reduce costs. Practical work. Selection of problems and writing-up of practice estimates. Experts in the lithographic trade as guest speakers. First semester: Introduction to estimating, basic accounting principles, and development of budgeted hourly costs for a plant. Expenses and how to distribute them. Materials and their storage and handling, offset photography, platemaking, and paper and its problems. Tours of photographic and platemaking installations. Second semester: Copy preparation, composition, offset press work, and bindery operations. Field trips to both hot metal and cold composition plants, an ink plant, a bindery, and a paper mill.

8-192. Fundamentals of Photography I

Fall, 2 credits. Repeated in Spring — Edward S. Cobb

This lecture course presents the principles of photography to explain the reasons for the various operations. It forms a foundation for all the more advanced courses in photography. The topics covered include: the nature of the photographic process, light as applied to photography, developing chemicals, factors in development, judging exposure, lenses and image formation, effects of lighting the subject, shutter performance, and fixing and washing.

8-193. Practice of Photography I

Fall, 3 credits. Repeated in Spring — Harry L. Burnett, Jr.

This course furnishes laboratory practice and demonstration of the principles taught in Fundamentals of Photography I. It offers the student an opportunity to become familiar with recommended procedures and techniques. Topics covered: contact printing and processing; selection of printing papers; processing of negative roll film, cut film and film pack; diagnosis and remedy of processing defects; types of cameras, their operation and uses, and the application of filters. *Prerequisite:* Fundamentals of Photography I, or taken concurrently with Fundamentals of Photography I.

8-195. Fundamentals of Photography II

Spring, 2 credits — Albert R. Merritt

The theory of projection printing, characteristics of photographic materials, exposure and exposure devices, types and functions of light filters, photographic lights and lighting, and the theory and application of sensitometry as a means of measuring and controlling the photographic process.

8-196. Practice of Photography II

Spring, 3 credits — Harry L. Burnett, Jr.

Subjects include: projection printing, application of sensitometric measurements, print correction, composite printing, use of variable contrast papers, lighting, rendition of form and texture, light patterns, the effect of light on color, toning, and print quality analysis. *Prerequisite:* Fundamentals of Photography I, Practice of Photography I, and Fundamentals of Photography II. May be taken concurrently with Fundamentals II.

8-194. Creative Photography through Composition I

Fall, 2 credits — Martin H. Miller

Practical help for the beginner as well as the experienced photographer. The course helps to develop an understanding of composition and design. Practice in applying to the student's own photographs the elements of composition that make superior pictures. Criticism and suggestions on prints and color slides. Discussion of original photographs by outstanding pictorial and photo-journalist photographers. Field trip. Course applies to color slides and black and white.

8-197. Creative Photography through Composition II

Spring, 2 credits — Martin H. Miller

Continuation of 8-194, but new students may register. Practical help is given the student to improve his pictures. Review of basic principles of composition and application to the student's own work. Understanding how to see a picture; how to present subject matter in interesting fashion. Use of photographs as medium of communication. Other topics covered include night photography, prize-winning pictures, and pictures for exhibition. The student is given criticism and suggestions on his prints and color slides and practice in analyzing and judging photographs. Several picture-taking field trips. Course applies to color slides and black and white.

8-333. Survey of Art

(*See* p. 103)

8-270. Color Photography I, Monopack Color Printing

Year, 3 credits each semester — Oscar Rodbell

Basic theory and practice in making color prints on positive color "Printon" and color negative "Ektacolor" materials. Lectures cover basic theory, nature of color and light, three-color theory, formation of colors, additive and subtractive processes, color temperatures, and transmission and absorption of filters. Laboratory includes selection of equipment, evaluation of transparencies and color negatives, proper exposure controls, mixing of chemical solutions, controls in color processing, and practical application of these fundamentals. *Prerequisite:* A good background in black and white photography and 4- × 5-inch size color negatives for practical application in the laboratory, or special permission.

8-272. Color Photography II—Separation Negatives for Color Printing

Year, 3 credits each semester — Oscar Rodbell

Theory and practice of making masks and color separation negatives for color printing. Lectures and supervised laboratory work cover in detail principles of highlight masking, color correction and contrast control masking, principles of making color separation negatives, selection of equipment and transparencies, production of highlight and principal masks, exposure and development control methods, and production of balanced color corrected separation negatives from transparencies and opaque copy. *Prerequisite:* Color Photography I, or the equivalent.

8-360. Portrait Photography

Year, 2 credits each semester — ELBRIDGE C. PURDY

A studio and darkroom course that provides opportunity for practice. The student learns through individual guidance the subtleties of fine portrait work. Lighting, posing, composition, processing, and re-touching. *Prerequisite:* Practice of Photography II.

8-011. Photographic Roundtable

Year, non-credit — WILLIAM C. MCHENRY

The Roundtable has been formed to provide opportunity for the continued study of photography. The group meets twice each month during the regular school year. One meeting is devoted to constructive analysis of photographic work presented by members; the other meeting is devoted to presentation of information about new developments and techniques in photography and to other topics of current interest. The Roundtable sponsors an Annual Salon.

Registration is open to persons who have completed any of the courses in photography offered by the Graduate School. Registration is required, and there is a small regulation fee.

Courses Offered at the National Institutes of Health

SCIENTIFIC ADVISORY COMMITTEE

DANIEL STEINBERG (Chairman)
ROBERT BERLINER
SEYMOUR S. KETY
CHRISTIAN B. ANFINSEN
ALAN H. MEHLER
ROBERT B. LIVINGSTON
KENNETH S. COLE
HEWITT G. FLETCHER
ROGER M. COLE
DEWITT STETTEN, JR.
DAVID SHAKOW
MURRAY C. BROWN

Committee on Administrative Courses

GLEN WILBUR (Chairman)
RICHARD HENSCHEL
ZELDA SCHIFFMAN
ROBERT LEARMOUTH
ESTHER DEEL
MURRAY C. BROWN

Committee on General Studies Courses

LEALON E. MARTIN (Chairman)
ERICH MOSETTIG
ALBERT DALTON
MURRAY C. BROWN

In the fall semester, 1954, the National Institutes of Health invited the Graduate School to offer a program of courses at the Bethesda Center, which would be designed to meet the particular needs of the employees of that center. All of the classes meet at the National Institutes of Health in Bethesda, and are open to all Government employees and to the general public. Registration can be completed at the National Institutes of Health or at the Graduate School.

BIOLOGY AND MEDICINE

1-250. Introductory and General Bacteriology

Year, 2 credits each semester — NORMAN MCCULLOUGH

Introductory and general bacteriology. Includes historical aspects, comparative microbiology, morphology, structure, taxonomy, physiology, growth, destruction and inhibition of microorganisms, sterilization and disinfection, bacterial metabolism, immunology, medical bacteriology, the bacteriology of water, milk, soil, and foods. No prerequisite is required; however, a year each of college chemistry and biology is desirable. Individuals lacking this background should obtain the consent of the instructor.

1-622. Clinical Bacteriology

Year, 2 credits each semester — ALEXANDER KIMLER

Diagonstic laboratory routines of the bacterial disease of man are stressed. A format is followed that relates sources and types of clinical specimens to the microscopic, cultural, and serological techniques used to identify specific pathogenic bacteria. *Prerequisites:* Some college chemistry, experience in clinical laboratory techniques, or the consent of the instructor.

1-628. Advanced Bacteriology—Bacterial Metabolism

Year, 2 credits each semester — HERMAN C. ELLINGHAUSEN

Designed to give a general background in bacterial metabolism as an introduction to more detailed biochemical study. Includes the physiological signifi-

cance of cellular structures; chemical composition of the cell; quantitative growth measurements and their relation to the growth curve phases; physical and chemical factors affecting growth and death; bacterial nutrition and chemical needs as illustrated by chemoautotrophs, and heterotrophs; the roles of carbon, nitrogen, minerals, and vitamins; formation and characteristics of enzymes; carbohydrates and energy relationships; dehydrogenation and respiration; redox; proteolysis; virulence as a physiological problem; and lipid metabolism. *Prerequisite:* Introductory bacteriology, college chemistry, and organic chemistry, or the consent of the instructor. Elementary biochemistry and pathogenic bacteriology are desirable.

1-275. Fundamentals of Virology

Year, 2 credits each semester — Wallace P. Rowe

A course in general virology for professional personnel. First semester: discussion of fundamental aspects of animal, bacterial, and plant viruses. *Prerequisite:* The consent of the instructor *only*. Second semester: continuation of the first, dealing with specific animal viruses, chiefly those infecting humans. *Prerequisite:* First semester, or the consent of the instructor.

1-349. General Mycology

Fall, 2 credits — Paul Lentz

An introduction to the fungi, their classification, and relationship to man. *Prerequisite:* Course in general biology, or the consent of the instructor.

1-449. Medical Mycology

Spring, 2 credits — Herbert Hasenclever

A course in fungal diseases of man and animals. Isolation, identification, physiology of the causal organisms, characteristics and treatment of the diseases. *Prerequisite:* Course in general mycology, or the consent of the instructor.

1-422. Human Physiology

Fall, 3 credits — David L. Aronson, Charles L. Greenblat, Saul Winegrad

A course in the physiology of health and disease, consisting of lectures, lecture-conferences, and demonstrations. Emphasis is on function in muscle, peripheral nerve, special senses, central and autonomic nervous systems, heart and circulation, respiration, kidney, water and electrolyte balance, temperature regulation, thirst, digestive system, and basal metabolism. *Prerequisite:* One year of undergraduate biology, chemistry, and physics, and the consent of the instructors.

[1-345.] Biochemical Genetics (1961–62)

Fall, 1 credit — Bruce N. Ames

Various topics in modern genetics and the fundamental experiments of classical genetics that led to current concepts will be covered from a biochemical point of view. Special emphasis will be placed on the genetics of viruses and microorganisms. Such topics as lysogeny, transduction, transformation, gene-enzyme relationships, and DNA structure will be covered. The theory and practice of the use of mutants in investigating biochemical systems will be presented, and genetically controlled diseases in humans will be discussed. *Prerequisite:* General biology and biochemistry.

1-346. Introduction to Human Genetics

Spring, 2 credits — Ntinos C. Myrianthopoulos

Lectures and seminar conferences. Review of basic genetics. The principles of heredity as applied to man and human populations; simple population statistics and special methods of human genetics; the inheritance of physical traits and clinical conditions with emphasis on the expression and detection of the heterozygote, the physiology of the gene, mutation rates and gene frequencies in the population. Applications of human genetics in clinical and legal medicine; genetic counseling and eugenics. *Prerequisite:* General zoology and college algebra. A course in elementary genetics is desirable but not essential.

1-455A. General Phenomena in Modern Cellular Physiology—First Half

Fall, 2 credits — Abraham Shanes

Properties common to all living cells that have proven susceptible of quantitative analysis. Distribution of materials between cells and their environment, diffusion and permeability characteristics of tissues, active transport, resting potentials, and the interrelationships among metabolism, the "passive" cellular characteristics, and the action of physiological and pharmacological agents. *Prerequisites:* General college physics, chemistry, and biology.

1-455B. Properties of Excitable Cells—Second Half

Spring, 2 credits — Abraham Shanes

The specialized features of nerve and muscle, including skeletal, heart, and smooth muscle, and junctions. The impulse or action potential, excitation, factors in junctional transmission, and muscle contraction. *Prerequisite:* 1-455A, or the consent of the instructors.

1-505. General Pathology

Fall, 2 credits — Richard L. Swarm

Introduction to the study of disease. Pathogenesis and morphologic alterations of human diseases are emphasized. Topics considered include circulatory disturbances, growth, development, degeneration, inflammation, hypersensitivity, abnormal metabolism, and neoplasia. *Prerequisites:* Histology and some training in gross anatomy, *i.e.,* gross human anatomy, comparative gross anatomy, and the like.

1-508. Special Pathology

Spring, 2 credits — Richard L. Swarm

Pathology for the laboratory worker or student. Preparation of specimens for morphologic study. Diseases of laboratory animals. Newer techniques for morphologic study. An introduction to the design of experimental problems involving morphologic alterations in infectious diseases, neoplasia, disturbances in metabolism, and others. *Prerequisite:* Course in general pathology, or the equivalent.

1-703. General and Comparative Physiology

Spring, 2 credits — Joseph F. Hoffman

Special topics designed to elaborate fundamental principles of cellular function. Concepts developed from studies of single cells, unicellular and multicellular organisms. Correlation of structure and function. Adaptations to diffusion, osmoregulation, circulation and composition of body fluids, comparative permeabilities of cellular membranes, secretion, cellular motion and excitation, cell division, photoreception and action of light, aspects of energy transformations. *Prerequisites:* General college biology, biochemistry and physics, and the consent of the instructor.

1-510. Immunology

Fall, 2 credits — Herbert F. Hasenclever

The nature of antigens, antibodies, antigen-antibody reactions, hypersensitivity, natural and acquired resistance, and the practical applications of immunology in medical science. *Prerequisites:* A course in microbiology is essential; some biochemistry is desirable, and the consent of the instructor should be obtained if this training is lacking.

1-305. History of Medicine and Medical Research

Fall, 2 credits — Morris Leikind

A survey of the development of medicine and medical research with emphasis on the period from the seventeenth century to modern times. Attention will be given to cultural and social backgrounds. Among the topics to be discussed are medical history in relation to the history of science and civilization; the antiquity of disease and medicine among ancient and primitive peoples; the evolution of anatomy and physiology; the microscope and its influence on medical science; the cell theory and the rise of pathology; the germ theory of disease; the discovery of insect transmitters of disease; anesthesia and antisepsis and their impact on the development of surgery; the story of the growth of biochemistry and biophysics; and the origin of academies and societies and their influence on medical research. Lectures will be illustrated and will be supplemented by visits to the Medical Museum of the Armed Forces Institute of Pathology and the Smithsonian Institution. The course is designed to be helpful not only to professional workers in medicine, but also to technicians and research assistants, librarians, information specialists, and those concerned with the administration of research and research grants.

Chemistry and Physics

5-125. Modern Physics

Fall, 3 credits. Repeated in Spring — Alan D. Morris

Fundamental particles, atoms and nuclei, origin of quantum theory, introductory discussion of special relativity, atomic structure and spectra, x-rays, radioactivity, and a survey of nuclear physics. *Prerequisites:* General physics and integral calculus.

5-100. General Chemistry (1960–61 and alternate years)

Year, 3 credits each semester — David F. Johnson

This course is intended to provide background in the problems and practices of chemistry for those whose principal interest lies in some other field or who are engaged in chemical work of a sub-professional nature. It includes descriptive chemistry of the commoner elements as well as a consideration, at the appropriate level, of the atomic theory, the periodic table of the elements, valence, the acid-base concepts, oxidation-reduction reactions, reaction rates and equilibria, pH, normality and molarity, and stoichiometry. Types of mathematical problems related to chemistry are discussed, and the student is required to establish a certain proficiency in this area. *Prerequisite:* One year of high school algebra.

[5-248.] Organic Chemistry (1961–62 and alternate years)

Year, 3 credits each semester — David F. Johnson

A systematic study of the fundamental chemistry of the compounds of carbon. Individual compounds of special interest, classes of compounds, and general theoretical considerations. The first semester is concerned with aliphatic compounds, the commoner functional groups, and various types of isomerism.

The second semester is devoted principally to aromatic chemistry. *Prerequisite:* General inorganic chemistry, or the consent of the instructor.

5-316. Introductory Biochemistry

Year, 2 credits each semester — Instructor to be announced

A comprehensive survey of biochemistry at the elementary level. Presenting the structure, function, and interrelationship of the major food stuffs, vitamins, minerals, hormones, and enzymes. Discussions of modern experimental approaches to metabolism at the cellular level and in the whole organism. *Prerequisites:* Inorganic and organic chemistry and some background in biology.

[5-643.] Advanced Topics in Biochemistry (1961–62 and alternate years)

Spring, 2 credits — Christian B. Anfinsen and Associates

The major aspects of modern biochemical research will be reviewed and integrated in blocks of lectures by experts in each field. The series will include consideration of such topics as protein, fat, carbohydrate chemistry and metabolism, the biochemistry of drugs and hormones, relation of structure to function, and the like. *Prerequisite:* Introductory biochemistry, or permission of the instructor.

5-725. Microbial Biochemistry (1960–61 and alternate years)

Year, 2 credits each semester — Earl R. Stadtman and William B. Jakoby

A comprehensive treatment of intermediary metabolism as studied in microbial systems. The course begins with some fundamental biochemical concepts and proceeds to detailed consideration of metabolic pathways and mechanisms. The comparative aspects of microbial metabolism are discussed. *Prerequisite:* Organic chemistry, and preferably general biochemistry.

5-726. Macromolecular Biochemistry

Fall, 2 credits — Peter T. Mora

The application of principles and methods of polymer chemistry to macromolecules in biochemistry. Methods of isolation and characterization of macromolecules and macromolecular complexes from tissues. Principles and outlines of methods of measuring polymer properties (size, shape, and charge) in solution, such as viscosity, osmometry, sedimentation, electrophoresis, and the like. Macromolecular interactions. Examples from research in the chemistry of polysaccharides, proteins, nucleic acids, and of synthetic polymers. *Prerequisite:* Organic and physical chemistry, or the consent of the instructor.

5-721. Basic Enzymology and Biological Energetics

Fall, 2 credits — Alan H. Mehler

A description of the general properties of enzymes: kinetics, chemical constitution, activators, inhibitors, cofactors, and specificities. Experimental methods are emphasized. Many metabolic sequences, including glycolysis and other pathways of carbohydrate metabolism, fat metabolism, the Krebs cycle, and electron transport, are analyzed in terms of the properties of individual reactions. *Prerequisites:* General biochemistry, or physical and organic chemistry, or the consent of the instructor.

5-722. Analytical and Descriptive Enzymology

Spring, 2 credits — Alan H. Mehler

Analysis of reactions and structures of macromolecules and their components. The use of enzymatic methods to establish structures, analysis of enzyme properties through reactions with known compounds. and the reactions of integrated

cell structures. Biological and chemical aspects are explored in the context of current investigations and speculations. *Prerequisites:* General biochemistry, or physical and organic chemistry, or the consent of the instructor.

[5-715.] Enzyme Induction and Activation (1961–62 and alternate years)

Fall, 1 credit — Barbara E. Wright

The first part of the course considers the mechanism and kinetics of enzyme induction, with particular emphasis on the B-galactesidase and penicillinase systems. "Sequential induction" and end-product regulation of the synthesis and activity of enzymes. The latter half deals with enzyme "activation" phenomena. Activation of enzymes under the influence of hormones, oxygen, and differentiation. Enzymatic changes during germination and during development in certain primitive multicellular systems. *Prerequisite:* General biochemistry.

5-440. Theory of Organic Chemistry

Fall, 2 credits — Louis A. Cohen

Elementary discussion of theoretical organic chemistry, dealing with the structure and properties of organic compounds and a brief survey of reaction mechanisms. Prior knowledge of mechanisms is not necessary, but a background in basic organic chemistry is recommended.

5-729. Application of Spectroscopy to Organic Chemistry

Spring, 2 credits — Louis A. Cohen

Non-mathematical discussion of ultra-violet, infra-red, and nuclear magnetic resonance spectroscopy in relation to organic and biological chemistry. Numerous examples of the use of spectra in determining the structure of organic compounds and in following the course of reactions. *Prerequisite:* Theory of Organic Chemistry, or the consent of the instructor.

5-349. Physical Chemistry

Year, 2 credits each semester — Ralph Brodd

Lecture course on the states of matter—gases, liquids, and solids; elementary thermodynamics, solutions, homogeneous and heterogeneous equilibria including the phase rule; ionic equilibria, conductance, electromotive force; chemical kinetics, and colloids. *Prerequisite:* General chemistry, qualitative and quantitative analysis, physics, and calculus, or permission of the instructor.

5-735. Chemical Kinetics in Biological Systems

Fall, 2 credits. Repeated in Spring — Dan F. Bradley

An introduction to chemical kinetics with emphasis on applications in biology. The early lectures will treat in some detail the transition state theory of reaction rates, methods of determining rate laws, current electronic theories of reaction mechanisms, and the interpretation of rate laws in terms of mechanism. Later lectures will deal with applications of these basic ideas to problems of stationary states, irreversible processes, enzyme kinetics, complex systems of reactions, and the theory and methods of analysis of networks of reactions in biological systems. *Prerequisites:* Differential and integral calculus and elementary physical chemistry, or the consent of the instructor.

5-720. Chemical Quantum Mechanics

Fall, 2 credits. Repeated in Spring — Dan F. Bradley

An introduction to quantum mechanics with emphasis on applications in the theory of chemical structure. The hydrogen atom, hydrogen molecule ion,

and hydrogen molecule will be treated in detail, as will the methods of perturbation and variation theory. The later lectures will deal with the extension of these techniques to valence bond, molecular orbital and crystal field models, and solution of problems in molecular structure theory. *Prerequisite:* Differential and integral calculus.

5-633. Molecular Structure in Biological Systems

Spring, 2 credits — David R. Davies

Introduction to X-ray diffraction methods for determination of molecular structure. Diffraction by crystals and methods for determination of atomic positions in crystals. Applications are selected from studies of molecules of biological interest, such as hemoglobin, myoglobin and vitamin B_{12}. The diffraction of X-rays by helices and the experimental evidence for the a-helix in proteins and the structure of deoxyribonucleic acid are examined in detail. *Prerequisites:* One year of college physics, one year of college mathematics, one year of calculus, or the consent of the instructor.

5-30. Elementary Practical Electronics (1960–61 and alternate years)

Fall, non-credit — Robert L. Bowman and Associates

An elementary survey of non-communication electronics for the laboratory worker who wants a conceptual understanding and practical ability to work with electronics from circuit diagrams or instructions, but who lacks background in physics and mathematics.

[5-413.] Biophysical Instrumentation (1961–62 and alternate years)

Fall, 2 credits — Robert L. Bowman

A survey course designed to present techniques of physical measurement and control. A descriptive rather than analytical approach covers the methods of measurement and control in use in industrial and physical laboratories. Expedient trail methods and improvisations applicable to research problems are emphasized. *Prerequisite:* College physics, or the consent of the instructor.

5-417. Chromatography

Fall, 2 credits — Erich Heftmann

Discussion of principles and application of adsorption, partition, ion-exchange, and electro-chromatography. *Prerequisite:* College chemistry.

5-434. Radioisotopes and Their Applications in the Medical Sciences

Spring, 2 credits — Howard L. Andrews

A brief introduction to atomic physics and a review of the properties of radioactive isotopes and their emissions. Theoretical and practical aspects of radioassay using proportional, geiger, and scintillation counting. A review of the kinds of information obtainable with isotopic techniques and, with the aid of examples from the literature, an analysis of problems in interpretation of isotope experiments. *Prerequisite:* One year of college physics.

5-648. Protein Chemistry

Fall, 2 credits — Harry A. Saroff

Preparation and properties of proteins; protein solubility; characterization and analysis; titration data and interpretation; the binding of neutral and charged molecules. Size, shape, and structure determinations; degradation and

modification reactions. *Prerequisite:* B.S. in chemistry. A working knowledge of physical chemistry, preferably one graduate course.

5-575. Biochemistry of Protein Hormones (1960–61 and alternate years)

Fall, 2 credits — Peter G. Condliffe

A survey of non-steroid hormones. The course covers methods of bioassay, isolation, chemical characterization and interactions with biochemical systems. Particular attention is paid to the hormones of the pituitary, the thyroid, and the pancreas. *Prerequisite:* College biochemistry, mammalian physiology, or the consent of the instructor.

[5-709.] Steroids: Chemical and Biological Aspects (1961–62)

Fall, 2 credits — Erich Mosettig and Erich Heftmann

Structure, nomenclature, reactions, and biosynthesis of sterols (including the D vitamins and terpenoids), cardiac glycosides, steroidal saponins and alkaloids, bile acids and hormones of the adrenal cortex and gonads. Synthesis and uses of steroidal drugs as well as biological activity and metabolism of steroids. Methods of isolation and analysis (spectrophotometry, chromatography, and tracer techniques). *Prerequisites:* Organic chemistry and biochemistry, or the consent of the instructors.

5-711. Mathematical Theory of Transport and Tracer Kinetics in Biological Systems

Fall, 2 credits — John L. Stephenson

Mathematical theory underlying analysis of transport problems in biological systems, with particular reference to tracer kinetics. Diffusion equation and its solutions, the n-compartment approximation to the diffusion equation, and the integral equation approximation. Related topics in differential and integral equations, matrix algebra, and operational mathematics as necessary. When possible, theory will be illustrated by examples from biological literature. *Prerequisite:* Differential and integral calculus, or the consent of the instructor.

Mathematics and Statistics

3-15. Mathematics for Management Analysts

Fall, non-credit — Harold A. Kahn

The course is designed as a refresher in, and to provide greater familiarity with, mathematical and statistical measures useful in management analysis. Elements of algebra, probability, permutations and combinations, sampling, significance testing, and differential calculus. Practical class exercise in probability sampling. *Prerequisites:* Limited to students with at least two years of working experience in management analysis and the consent of the instructor.

3-165. Introduction to the Calculus

Year, 2 credits each semester — Instructor to be announced

Brief review of techniques of elementary mathematics. The remainder of the first semester is concerned with developing an understanding and appreciation of the concepts that underlie analysis—the derivative and the definite integral are defined—independently—and the Fundamental Theorem proved. In the second semester, the physical interpretation of the integral is discussed, and the calculus of the elementary transcendental functions (log, exponential, trigonometric, and inverse trigonometric) is then considered from both differential and

integral points of view, simultaneously where possible. Standard techniques of integration are discussed with use of tables in mind. More advanced topics are considered as the interests of the class warrant.

3-406. Introduction to Experimental Statistics (1960–61 and alternate years)

Year, 2 credits each semester — Donald F. Morrison

Some of the fundamental bases of statistical analysis, followed by a consideration of the tests of significance most generally useful in the analysis of experiments in the life sciences. Includes the usual tests of significance and confidence intervals on means and variances. Tests on proportions and categorical data, the analysis of variance, correlation and curve fitting, and bioassay. *Prerequisite:* Bachelor's degree.

3-409. Introduction to Determinants and Matrices

Year, 2 credits each semester — Seymour Geisser

Determinants and their application to sets of linear equations; linear dependence; vector spaces; operations with matrices; rank of a matrix; characteristic equation roots and vectors of a matrix; reduction to canonical forms, special types of matrices; bilinear forms; quadratic forms; Hamilton-Cayley theorem. *Prerequisites:* College algebra and calculus.

3-414. Mathematics of Digital Computation

Year, 2 credits each semester — Norman Z. Shapiro

Miscellaneous topics in advanced mathematics relevant to the applications and uses of digital computers. The topics considered will include coding techniques, information theory, Boolean algebra, matrix theory, numerical methods, and linear and non-linear least square techniques. *Prerequisite:* Mathematics through the integral calculus and linear algebra, or the consent of the instructor.

3-511. Ordinary Differential Equations

Fall, 2 credits — Clifford S. Patlak

An introduction to ordinary differential equations with emphasis on the setting up and solving of equations that arise in the life sciences. Equations of the first order and higher order linear equations with constant coefficients are covered. Additional topics if time permits. *Prerequisites:* Differential and integral calculus.

3-699. Design of Experiments

Spring, 2 credits — Donald F. Morrison

Ideas underlying modern work on the statistical aspects of experimental design. This course is for the research worker without a mathematical background. Principles covered include the assumptions and mathematical models required for the analysis of variance in different experimental designs randomization, and choice of number of observations. The designs discussed are the completely randomized, randomized blocks, Latin Squares, factorials, and balanced incomplete blocks. The use of concomitant variables for reducing the error of treatment comparisons is discussed for certain of these designs. Some non-parametrical alternatives to the analysis of variance will also be considered. *Prerequisites:* Bachelor's degree and an introductory course in statistics.

Foreign Languages

2-70. Advanced German

Spring, non-credit — Erich Mosettig

Reading of professional and nonprofessional literature and discussion of specific problems and topics as dictated by individual needs. Conducted in German. *Prerequisite:* Two to three years of college German, or the equivalent.

2-49. Basic Scientific and Medical Russian

Fall, non-credit — Marina Krassensky

Introduction to the written Russian language with emphasis on writings in the biological, medical, and related fields. Fundamentals of grammar and syntax combined with readings in simpler texts, progressing to individual assignments in the current Soviet journals in the students' fields of interest. One two-hour meeting a week. No previous knowledge of Russian required.

2-55. Readings in Scientific and Medical Russian

Spring, non-credit — Marina Krassensky

Weekly reading assignments from Russian journals of students' choice. During class meetings, the assignments are discussed and elucidated. Special attention is given to vocabulary building and review of grammar essentials. One two-hour meeting a week. *Prerequisite:* Basic scientific and medical Russian, first-year Russian, or the equivalent.

Public Speaking

2-212. Improving Professional Speaking I

Fall, 2 credits — Lionel W. Nelson

A basic course in public speaking designed to enable the student to improve his speaking in general, with emphasis on the handling of speech situations peculiar to professional occupations. Special attention is given to (1) emotional adjustment, (2) the development of an efficient and pleasing voice, and (3) the development of a sense of immediacy and audience contact. These skills are exercised in the weekly preparation and delivery of short speeches, descriptive, informative, or narrative.

2-213. Improving Professional Speaking II

Spring, 2 credits — Lionel W. Nelson

A continuation of Improving Professional Speaking I. Special attention is given to (1) the development of the entire speaking personality as demonstrated through vocal and physical delivery, (2) the development of the ability to select, organize, and develop ideas for presentation, and (3) the development of the ability to read aloud effectively materials from the printed page. These skills are exercised in the weekly preparation and delivery of short speeches, argumentative or persuasive. *Prerequisite:* Improving Professional Speaking I, its equivalent, or permission of the instructor.

Correspondence Program

COMMITTEE

E. J. Peterson (Chairman)

Louise O. Bercaw
Mary L. Collings
C. Edwin Davis
William A. DeVaughan
Cannon C. Hearne
Hans S. Hoiberg
James L. Robinson
James H. Starkey
Galen Yates
George A. Young

The following courses are open to qualified field employees of the Federal Government and to others as facilities permit. Persons who wish further information or who wish to register in one of the courses should write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

125C. Basic Lettering

1 credit (7 lessons) — Eugene May

Designed to familiarize the student with the fundamentals of lettering with applications to soil survey charts and maps. Topics covered are basic strokes, spacing, use of the contour pen, and lettering of symbols on aerial photographs. *Cost:* $12 and $8 for supplies and postage. (This does not include the lettering tools.)

130C. Plain Letter Writing

Non-credit (6 lessons) — Willard G. Olsen and Artel Ricks

Modern government letter writing techniques by the 4-S formula for Shortness, Simplicity, Strength, and Sincerity. An adaptation of the well known "Plain Letters Workshop." Added supplemental reading and work assignments. Designed for government employees without access to a "Plain Letters Workshop." Emphasis on skills of communication rather than grammar. *Cost:* $12 and $4 for supplies and postage.

114C. Federal Personnel Procedure

2 credits (16 lessons) — Henry C. Starns

Legal, regulatory, and procedural aspects of Federal personnel administration. Designed to (1) broaden the technical knowledge of persons engaged in personnel work; (2) inform persons in other administrative activities about personnel requirements and activities; or (3) acquaint employees in general with the laws and regulations governing their status and their rights as Federal employees.

The course starts with a study of the purpose and place of personnel activities in the Government, including a review of the basic laws and authorities for personnel action, position classification activities, recruiting, and administrative activities that precede the appointment process. Several lessons are devoted to requirements and procedures involved in personnel actions such as appointments, promotions, removals, retirements, reductions in force, and disciplinary actions. The final lessons are concerned with personnel activities involving a minimum of standard regulation, procedure and practice, such as training, incentive awards, employee relations, employee performance. *Cost:* $24 and $8 for supplies and postage. Text materials are extra.

201C. Administration and Supervision—Basic Principles and Practices

2 credits (16 lessons) GEORGE A. YOUNG, WILLIAM R. VAN DERSAL and ASSOCIATES

Designed for persons who direct activities of a group of employees, regardless of number, and for those who desire to become qualified to handle supervisory and administrative responsibilities. Basic management principles. Application of these principles in relation to the most effective managerial practices. Consideration of the most prevalent administrative and supervisory deficiencies, their causes and remedies. Assists the student to prepare to serve effectively as the administrative head of an organizational unit. *Cost:* $24 and $8 for supplies and postage. A text is recommended but not required.

236C. Report Writing

2 credits (15 lessons) JAMES PICKENS

A practical course designed to aid members of the field forces in preparing memoranda and reports to administrative heads. The fundamentals of English composition are briefly and simply treated, and special attention is given to clear, concise, orderly, informative presentation and to avoiding the more common faults of expression. *Cost:* $24 and $8 for supplies and postage. The text is extra.

316C. Soils and Soil Management

2 credits (15 lessons) J. GORDON STEELE

Practical aspects of soil management. Physical, chemical, and biological properties of soils. How soils are formed. Soils of different places. How soils are changed by erosion, depletion, and improvement. Management of soils for good production and for their conservation and improvement. *Prerequisite:* Chemistry equivalent to that covered in high school. Students who lack a background of at least high-school chemistry should expect to do extra reading. Preparation in physics is helpful but not essential. *Cost:* $24 and $8 for supplies and postage. The text is extra.

321C. Farm Forestry

2 credits (15 lessons) JOHN F. PRESTON

A course in the growing of wood as a farm crop. Principles of forestry as integrated with the farm business, and as contrasted with commercial forestry. The management of woods on the farm; development of a farm woodland enterprise. Designed to assist those who teach agriculture or assist farmers in its practice, professional foresters, and farmers to apply forestry techniques to the special problems of growing wood as a farm crop. Students should have access to a farm woods because at least one-third of the lessons require field work. *Prerequisites:* Two years of college, or practical experience in woods or farm operations as a partial substitute. *Cost:* $24 and $8 for supplies and postage. The text is extra.

325C. Legal Aspects of Investigations—Criminal Evidence and Procedure

2 credits (16 lessons) JOHN F. DONOGHUE

Designed to provide investigative personnel, and those desiring to prepare for such work, background and insight into the legal aspects of crime investigations: procedures concerning admission of evidence; circumstances and conditions under which evidence is of probative value; crimes and their elements; and court

procedures. Because all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects. *Cost:* $24 and $8 for supplies and postage.

362C. Federal Meat Inspection and Animal Quarantine Laws

2 credits (16 lessons) LOWELL E. MILLER

A study of the history, constitutionality, and provisions of the Federal Meat Inspection Act and related legislation, and the Animal Quarantine statutes, with particular reference to the law of search and seizure, affidavits, hearsay and other rules of evidence. The course is intended as an aid to administrative officials. No previous legal training is required. *Cost:* $24 and $8 for supplies and postage.

410C. Safety Program Administration

2 credits (15 lessons) SETH JACKSON

A practical course aimed to help supervisors and staff at all levels with their accident prevention problems. It covers the history and the principles of accident prevention, the basic needs of a safety man, how to appraise training needs and maintain interest in safety efforts. The fundamentals of an effective safety program and some sure-fire formulas successfully used in industry and government are also included. The emphasis is on prevention through human relations rather than on investigation of accidents after they happen. *Cost:* $24 and $8 for supplies. The text is extra.

513C. Statistical Methods in Biology and Agriculture

2 credits (15 lessons) E. L. LE CLERG

This course uses Snedecor's textbook "Statistical Methods," and follows its outline largely but not absolutely. Each of the 15 lessons consists of narrative material, textbook assignments, questions, and problems. The reports are returned with corrections and comments. Subjects discussed include simple variation, regression and correlation, analysis of variance and covariance, chi-square, multiple and curvilinear correlation, application to sampling and experimental design. Practical application of methods is kept to the front. Facility in the use of arithmetic and simple algebra is necessary. *Cost:* $24 and $8 for supplies and postage. The text is extra.

515C. Statistics of Biological Assay

2 credits (15 lessons) F. M. WADLEY

General principles. Specialized methods that have been developed for planning and analyzing experiments. Graded and all-or-none responses. Estimates of potency. Comparisons of materials. Joint action, variances, and other phases. *Prerequisite:* A course similar to Statistical Methods in Biology and Agriculture. *Cost:* $24 and $8 for supplies and postage. The text is extra.

521C. Experimental Design

2 credits (16 lessons) F. M. WADLEY

Students enrolling in this course should have a genuine practical interest in experimentation, and some facility in statistical calculations, including analysis of variance as shown by texts such as Snedecor's or Goulden's. The course is intended to give the student an introduction to basic concepts, some practice in applying them, and some acquaintance with the literature opening the way to further study. The philosophy and fundamentals are first treated, with some

attention to elementary sampling principles. Next are presented lessons on simpler practical designs, as to use and analysis of results. Last come lessons on factorial design, confounding and more complex experiments, including incomplete block designs. "Experimental Designs," by Cochran and Cox, is used as a text, with some supplementary discussion. *Cost:* $24 and $8 for supplies. The text is extra.

533C. Hydrology I

3 credits (16 lessons) DONALD R. BAKER

Review of elementary hydraulic principles basic to a study of flow in natural channels. The phenomena of meteorology that control climate. Methods of collecting data essential to hydrology. The physical characteristics of the land that control the disposition and movement of the earth's water. *Prerequisite:* Physics and algebra. Elementary meteorology, statistics, and engineering are desirable, but not required. *Cost:* $36 and $8 for supplies and postage. The text is extra.

534C. Hydrology II

3 credits (16 lessons) DONALD R. BAKER

The tools used by the hydrologist and the application of these tools to specific problems. Hydrograph analysis, runoff relations, runoff distribution, waves, streamflow routing. Special techniques required in the design of projects. Design and operation of water control works. Small basin problems. River forecasting. *Prerequisite:* Hydrology I or an equivalent course. *Cost:* $36 and $8 for supplies and postage. The text used in Hydrology I is used also in this course.

580C. History of American Agriculture

3 credits (16 lessons) WAYNE D. RASMUSSEN

Development of American agriculture from colonial settlement to the present, treated on a chronological basis. Designed to give a historical background for understanding present-day agricultural problems. Particular attention is given the two major technological revolutions in American agriculture, the Department of Agriculture, the Land Grant Colleges, the application of science and technology to farming, and government policies affecting agriculture. *Cost:* $36 and $8 for supplies and postage. The text is extra.

700C. Directed Change in Contemporary Cultures

2 credits (16 lessons) M. L. WILSON and THELMA A. DREIS

International and national programs in the field of technological assistance, with emphasis on the underlying principles in social change and their application to the types of institutional arrangements in different countries for bringing about extension education and community development. In the analysis of the culture concept, attention is directed primarily to non-Western cultures. The economic and social factors in cultural change, the learning process, training of leaders, human relations, and other modifications and adaptations are considered. Although the point of view is the total culture and economy of a country, emphasis is placed on rural aspects and village development, with some consideration of urban problems. *Cost:* $24 and $8 for supplies and postage. Text materials are extra.

SPECIAL PROGRAM IN METEOROLOGY

The following is a special in-service training course in meteorological analysis and prediction given in cooperation with the U. S.

Weather Bureau. The program is under the general direction of Albert V. Carlin, Chief of Training, United States Weather Bureau, Department of Commerce.

535C. Modern Methods of Meteorological Analysis and Prediction

4 credits (8 lessons) JAY S. WINSTON and ASSOCIATES

An advanced course designed to provide the practicing field meteorologist with a better understanding of some of the techniques and concepts that are of importance in present-day forecasting. Topics are: hemispheric synoptic map analysis, predicting motion and development of waves in the westerlies, numerical weather prediction, large scale-vertical motion and divergence, isentropic analysis, the jet stream, statistical prediction methods, and forecasting tornadoes and severe thunderstorms. Reading assignments covering each of these topics have been selected from a variety of recent articles and books. Each lesson contains an extensive laboratory exercise, which serves to illustrate the particular topic by practical analysis of, or computation from, typical synoptic cases. *Prerequisite:* Basic knowledge of synoptic and dynamic meteorology and weather forecasting.

SPECIAL PROGRAM IN REA ACCOUNTING

Three correspondence courses designed for Borrowers' personnel of the Rural Electrification Administration are available. The basic accounting course is also suitable for students other than REA personnel who want to learn the elementary principles of accounting.

100C. Basic Accounting

Non-credit (12 lessons) HOWARD C. PAINE, JOHN W. SCOTT, and ASSOCIATES

An introduction to accounting for those who have need of some knowledge of accounting, as taxpayers, as employees having certain accounting duties, as managers or directors of a business, or as students embarking on a program of studies including ultimately more specialized accounting. The course progresses from basic definitions and principles through journalizing, posting, general and subsidiary records, adjustments and accruals, and depreciation to financial statements and ratios, and the closing of the books. A thorough grounding in basic accounting theory and its practical application is provided by the course. *Cost:* $24.00 and $8.00 for supplies and postage.

200C. REA Borrower Accounting (Electric)

Non-credit (12 lessons) JOHN W. SCOTT and ASSOCIATES

Designed primarily to train persons who are now, or intend to be in the future, office managers, accountants, or bookkeepers in offices of electric utility cooperatives financed by the Rural Electrification Administration. The course is also valuable to REA employees and to directors and managers of REA-financed cooperatives and to certified public accountants, attorneys, and engineers engaged by them. The subject matter progresses from a discussion of the accounts and accounting records used through the construction accounting procedure, methods of opening, maintaining, and closing the books, financial and statistical reports and their analysis, technical aspects of REA electric-borrower accounting, continuing property records, and budgeting, requesting, accounting for, and repaying REA loan funds.

In addition to providing the student with a working knowledge of the accounting basic to the electric utility industry, the course also instructs in the unique accounting requirements arising from the manner in which REA borrowers are financed and the nonprofit nature of those borrowers organized as cooperatives. The Administrator of the Rural Electrification Administration will award a Certificate of Proficiency to students who satisfactorily complete the course. *Prerequisite:* Course 100C—Basic Accounting, the equivalent, or one year's experience in an REA borrower's office as bookkeeper or assistant bookkeeper. *Cost:* $36.00 and $8.00 for supplies and postage.

300C. REA Borrower Accounting (Telephone)

Non-credit (12 lessons) HOWARD C. PAINE and ASSOCIATES

This course is designed to provide training to present or prospective bookkeepers and accountants employed by telephone utilities that are borrowers from the Rural Electrification Administration, and to provide information on telephone utility accounting to directors, managers, and others concerned with the activities of these borrowers. The first lessons deal with recommended books of account and the basic accounting systems applicable generally to the telephone industry. The course progresses in subsequent lessons through a discussion of the accounting to be performed during the periods of organization, construction, and operations; the requesting and accounting for REA loan funds; the computation of interest on, and repayment of, REA loan obligations; and recommended plant accounting procedures through the final lesson on construction and retirement work order procedures.

Through the successful completion of this course, the student should acquire an overall understanding of the accounting systems applicable to the telephone industry and a working knowledge of specific procedures unique to telephone utilities financed by REA. The Administrator of the Rural Electrification Administration will award a Certificate of Proficiency to students who satisfactorily complete the course. *Prerequisite:* Course 100C—Basic Accounting, the equivalent, or one year's experience as bookkeeper or assistant bookkeeper in the office of a telephone company or cooperative. *Cost:* $36.00 and $8.00 for supplies and postage.

Faculty

Faculty, Departmental, and Special Committees

The year following the name represents the first year of association with the Graduate School.

Acker, Laurence W., (1948). Tyler Commercial College. Director, Accounting and Finance Policy Division, Office of Assistant Secretary of Defense (Compt.). Taught at Columbus School of Accounting. (Public Administration)

Adelson, Sadye F., (1949). M.A., California. Nutrition Analyst, Institute of Home Economics, Agricultural Research Service, USDA. (Technology)

Aiton, Edward W., (1953). Ed.D., Maryland. Director, Four-H Club and YMW Programs, Federal Extension Service, USDA. (Social Sciences)

Allin, Bushrod, W., (1939). Ph.D., Wisconsin. Chairman, Outlook and Situation Board, Agricultural Marketing Service, USDA. Taught at Wisconsin. (Social Sciences)

Allison, Lowell E., (1959). Ph.D., Illinois. Soil Scientist, U. S. Salinity Laboratory, Agricultural Research Service, USDA. (Biological Sciences)

Ames, Bruce N., (1955). Ph.D., California Institute of Technology. Scientist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

Andrews, Howard L., (1960). Ph.D., Brown. Head, Radiation Physics Section, Radiation Branch, National Cancer Institute, and Radiation Safety Officer, National Institutes of Health, Department of Health, Education, and Welfare. Taught at American, Brown, and Rhode Island. (NIH)

Andrews, Justin M., (1960). Ph.D., Brown; Sc.D., Johns Hopkins. Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Johns Hopkins and Philippines. (Biological Sciences)

Anfinsen, Christian B., (1954). Ph.D., Harvard. Chief, Laboratory of Cellular Physiology and Metabolism, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Harvard. (NIH)

Appleman, Paul L., (1946). Occupational Specialist, Bureau of Programs and Standards, Civil Service Commission. (Public Administration)

Arnold, Olga Moore, (1954). B.A., Wyoming. Information Specialist, U. S. Information Agency. (Languages and Literature)

Aronson, David L., (1960). M.D., Pennsylvania. Coagulation Investigation, Division of Biologics Standards, Office of the Director, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

Askegaard, David, (1950). B.S., North Dakota. Head, Operations Section 8, Southwest Area, Rural Electrification Administration, USDA. (Technology)

Aylesworth, Philip F., (1949). M.S., Purdue. Assistant to the Administrator, Federal Extension Service, Liaison Officer with National Rural Church Leaders, USDA. (Social Sciences)

Bachman, Kenneth L., (1950). Ph.D., Harvard. Assistant Director, Farm Economics Research Division, Agricultural Research Service, USDA. (Social Sciences)

Bahn, Catherine I., (1953). M.A., Columbia. Head, Acquisitions Section, Map Division, Library of Congress. (Physical Sciences)

Bailey, S. O., (1960). M.S., Iowa State. Electronics Scientist, Naval Research Laboratory, Department of the Navy. Taught at West Virginia. (Physical Sciences)

Baker, Byron B., (1957). B.S., Washington. Deputy Head, Marine Geography Section, Hydrographic Office, Department of the Navy. Taught at Washington. (Physical Sciences)

Baker, Donald R., (1958). B.S., Kansas. Assistant Chief, Hydrologic Investigations Section, U. S. Weather Bureau, Department of Commerce. (Correspondence)

Baker, Gladys L., (1945). Ph.D., Chicago. Agricultural Historian, Agricultural Marketing Service, USDA. (Public Administration)

Baldauf, Tony M., (1951). Chief, Procurement and Property Management Division, Office of Plant and Operations, USDA. (Office Techniques and Public Administration)

Bamford, Ronald, (1949). Ph.D., Columbia. Dean of Graduate School, University of Maryland. (Biological Sciences)

Bargin, Germaine, (1954). Diplomeé, Université de Paris and de l'Institut d'Amerique Latine de Mexico Taught at Catholic. (Languages and Literature)

Barlow, Shirley, (1959). Administrative Assistant, Assistant Administrator, Federal Extension Service, USDA. (Office Techniques)

Bartlett, Richard P., Jr., (1957). M.S., Virginia Polytechnic Institute. Statistician, Agricultural Marketing Service, USDA. (Mathematics and Statistics)

Batchelder, Esther L., (1960). Ph.D., Columbia. Director, Clothing and Housing Research Division, Institute of Home Economics, USDA. Taught at Arizona, Columbia, Rhode Island, and Washington State. (Agricultural Research Center Committee)

Bates, C. C., (1955). Ph.D., Texas A & M. Environmental Systems Coordinator, Chief of Naval Operations, (Development), Development Planning Group, Department of the Navy. (Physical Sciences)

Bauer, Carl F., (1955). B.A., St. John's. Lecturer, National Catholic School of Nursing, Catholic and Maryknoll Seminary, Ossining, New York. (Social Sciences)

BAUER, MAGNA E., (1943). Auguste Victoria Lyzeum, Berlin. Office of the Chief of Military History, Department of the Army. (Languages and Literature)
BEALES, JAMES A., (1948). Chief, Photographic Laboratory Section, Facilities Branch, U. S. Information Agency. (Technology)
BEAR, N. ROBERT, (1948). B.S., Ohio State. Chief, Division of Personnel Management, Office of Personnel, USDA. Taught at Michigan State and Ohio State. (Public Administration)
BEATY, LAYNE R., (1957). Chief, Radio and Television Service, Office of Information, USDA. (Committee on Information)
BECKMAN, NORMAN B., (1958). Ph.D., Columbia. Management Analyst, Office of Management and Organization, Bureau of the Budget. (Public Administration)
BELL, E. DONALD, (1951). Labor Relations Assistant, Southern Railway System. (Office Techniques)
BENEDICT, TRUMAN G., (1957). B.S., Tennessee. Special Assistant to Chief of Ordnance, U. S. Army. (Public Administration)
BENSON, WILLIAM E., (1960). Ph.D., Yale. Program Director for Earth Sciences, National Science Foundation. (Physical Sciences)
BENTON, MILDRED C., (1950). B.A. in L.S., George Washington. Consultant in Research Information, Naval Research Laboratory, Department of the Navy. (Special Programs and Physical Sciences)
BERCAW, LOUISE O., (1949). Assistant Director of the Library, USDA. (Committee on Correspondence Study and Extension Education)
BERLINER, ROBERT, (1955). M.D., Columbia. Associate Director in Charge of Research, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Columbia, George Washington, and New York. (NIH)
BLASKY, HAROLD F., (1960). LL.B., Harvard. Assistant Chairman, Corps of Engineers, Board of Contract Appeals, Office of the Chief of Engineers, Department of the Army. (Public Administration)
BLICKENSDERFER, J. P., (1949). Ph.D., Harvard. Administrative Editor, Permanent Committee for the Oliver Wendell Holmes Devise, Library of Congress. Taught at Harvard, Oklahoma, Pittsburgh, and Washington. (Languages and Literature)
BOLLO, LOUISE E., (1952). B.A., George Washington. Nosologist, Public Health Service, Department of Health, Education, and Welfare. (Biological Sciences)
BOTTS, RALPH R., (1946). B.S., Florida. Head, Agricultural Risks and Insurance Section, Farm Economics Research Division, Agricultural Research Service, USDA. (Mathematics and Statistics, Office Techniques, and Public Administration)
BOWMAN, ROBERT L., (1954). M.D., New York. Medical Director, Laboratory of Technical Development, National Heart Institute, National Institutes of Health, Department of Health, Education and Welfare. (Physical Sciences and NIH)
BOYD, LUCILE N., (1954). Employee Development Officer, Internal Revenue Service, Department of the Treasury. (Office Techniques)
BRADLEY, DAN F., (1958). Ph.D., California. Research Chemist, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. Taught at California. (NIH)
BREIMYER, HAROLD F., (1956). Ph.D.,American. Council of Economic Advisers, Executive Office of the President. (Social Sciences)
BREWSTER, JOHN M., (1949). Ph.D., Columbia. Agricultural Economist, Agricultural Research Service, USDA. Taught at Columbia. (Social Sciences)
BRODD, RALPH, (1956). Ph.D., Texas. Chemist, National Bureau of Standards, Department of Commerce. (NIH)
BROWN, HUGH J., (1960). Free-lance artist. (Technology)
BROWN, MURRAY C., (1954). M.D., Virginia. Chief, Clinical and Professional Education, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
BROWN, PHILIP, (1956). B.A., Niagara. Director, Information Staff, Farmers Home Administration, USDA. (Committee on Information)
BUCCI, D. A., (1959). B.S.E., George Washington. Chief, Programs and Material Division, Department of Cartography, Army Map Service, Department of the Army. (Technology)
BURKHART, M. D., (1955). M.S., Pennsylvania State. Oceanographer, Hydrographic Office, Department of the Navy. (Physical Sciences)
BURNETT, HARRY L., JR., (1956). In charge of Photographic Services, Office of Architect of the Capitol. (Technology)
BUTLER, FRANCES A., (1952). Director of Secretarial and Business School, Emerson Institute. Taught at Temple Secretarial School. (Office Techniques)
BUTLER, K. A., (1949). B.S., Minnesota. Director, Internal Audit, Agricultural Research Service, USDA. (Public Administration)

CARLIN, ALBERT V., (1951). B.S., Boston. Chief of Training Section, U. S. Weather Bureau, Department of Commerce. (Physical Sciences and Correspondence)
CARLSON, THEODORA E., (1952). B.A., Nebraska. Editor, *School Life*, Office of Education, Department of Health, Education, and Welfare. (Committee on Publications)
CARLSON, WILLIAM A., (1956). M.P.A., Harvard. Examiner, Office of Budget and Finance, USDA. (Office Techniques)
CARTER, PAUL S., (1955). M.B.A., Northwestern. C.P.A. Supervisory Auditor, Army Audit Agency, Department of the Army. (Public Administration)
CAVIN, JAMES P., (1938). Ph.D., Harvard. Chief, Statistical and Historical Research Branch, Agricultural Economics Division, Agricultural Marketing Service, USDA. Taught at Catholic and Puerto Rico. (Social Sciences)
CERINE, WILHELMINA M., (1957). B.S., Teachers College, Columbia. Training Assistant, Naval Research Laboratory, Department of the Navy. Taught at Naval Research Laboratory and Public Schools, New Jersey and Pennsylvania. (Office Techniques)
CHAMBERS, BERNIECE, (1958). M.A., George Peabody. Speech Therapist, Montgomery County Board of Education, Maryland. (Languages and Literature)

CHASSAN, JACOB B., (1958). Ph.D., George Washington. Mathematical Statistician, Educational Statistics Branch, Office of Education, Department of Health, Education, and Welfare. Taught at George Washington. (Mathematics and Statistics)

CHESSIN, PAUL L., (1960). Ph.D., Maryland. Senior Mathematician, I. B. M. Space Computing Center. Taught at Columbia, Maryland, and Wisconsin. (Mathematics and Statistics)

CHINN, YUEN YUEY, (1956). M.F.A., Columbia. John Hay Whitney Fellowship. (Technology)

CHRISTENSEN, RAYMOND P., (1959). Ph.D., Wisconsin. Agricultural Economist, Farm Economics Research Division, Agricultural Research Service, USDA. (Social Sciences)

CHURCHILL, ETHAN D., (1950). Ph.D., Catholic. Consulting Ecologist, Intelligence and Systems Analyst. (Technology)

CLARK, RUSSELL W., (1959). Printing Production Specialist. (Technology)

CLAUSEN, JOHN A., (1960). Ph.D., Chicago. Chief, Laboratory of Socio-Environmental Studies, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Cornell. (Social Sciences)

CLEMENTS, FORREST E., (1949). Ph.D., California. Consultant, Stewart, Dougall and Associates, Inc. Taught at California, Oklahoma, and Yale. (Social Sciences)

COBB, EDWARD S., (1947). Head, Specifications and Tests Division, Naval Photographic Center, Department of the Navy. (Technology)

COGGESHALL, WALDEN, (1959). B.S., South Carolina. Assistant Director, Division of Management Research, Office of the Secretary, Department of Interior. (Public Administration)

COHEN, LOUIS A., (1957). Ph.D., Massachusetts Institute of Technology. Chemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Yale Medical School. (NIH)

COLE, KENNETH S., (1957). Ph.D., Cornell. Chief, Laboratory of Biophysics, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Chicago, Columbia, and Cornell. (NIH)

COLE, ROGER M., (1954). Ph.D., Harvard; M.D., Boston. Chief, Respiratory Bacteriology Unit, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Georgetown and Harvard. (NIH)

COLLINGS, MARY L., (1952). D.Ed., George Washington. Chief, Extension Training Branch, Division of Extension Research and Training, Federal Extension Service, USDA. (Committee on Correspondence Study and Extension Education and Social Sciences)

COMPTON, LAWRENCE V., (1952). M.A., California. Head Biologist, Plant Technology Division, Soil Conservation Service, USDA. (Biological Sciences)

CONDLIFFE, PETER G., (1956). Ph.D., California. Biochemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Cornell Medical College. (NIH)

COOK, CHARLES E., (1959). B.A., Washington. Cartographer, Photogrammetry Division, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at Coast and Geodetic Survey. (Technology)

COOPER, JOHN C., (1946). B.A., Furman. Deputy Director, Office of Budget and Finance, USDA. (Committee on Internal Audit and Public Administration)

COPELAND, HARLAN, (1960). M.Ed., Maryland. Extension Educationist, Division of Research and Training, Federal Extension Service, USDA. (Social Sciences)

CORNSWEET, ALBERT C., (1947). Ph.D., North Carolina. Chief Clinical Psychologist, Mental Hygiene Clinic, Veterans Benefits Office, Veterans Administration. Professorial Lecturer at American. Clinical Consultant in Training in Psychology at Catholic. Taught at Brown, Catholic, and North Carolina. (Social Sciences)

COVINGTON, CHARLES P., JR., (1959). B.A., Washington College. Message Technician, Remington Rand UNIVAC. Taught at Johns Hopkins. (Mathematics and Statistics)

COWAN, RICHARD S., (1958). Ph.D., Columbia. Associate Curator, Division of Phanerogams, Smithsonian Institution. Taught at Hawaii and New York Botanical Garden. (Biological Sciences)

COWING, AMY G., (1947). B.A., B.Ed., George Washington. Extension Analyst, Division of Extension Research and Training, Federal Extension Service, USDA. (Languages and Literature)

CULLIN, WILLIAM H., (1959). M.S., Massachusetts Institute of Technology. Commander, United States Navy. Taught at San Diego Junior College, San Diego State, and U. S. Naval Academy. (Technology)

CULLINANE, JOHN J., (1959). B.E.E., Catholic. Electronic Engineer, Diamond Ordnance Fuze Laboratories. (Technology)

CUNNINGHAM, JOHN J., (1959). B.S.I.E., Northeastern. Chief, International Training and Education Liaison, Federal Aviation Agency. (Languages and Literature)

CUNNINGHAM, VIRGINIA, (1960). B.A. and Certificate in Library Science, Wisconsin. Head, Music Section, Descriptive Cataloging Division, Library of Congress. (Languages and Literature)

CUTLER, JOY, (1960). B.S., Carthage. Administrative Assistant, Rural Electrification Administration, USDA. Taught at Kansas State and Ohio. (Office Techniques)

CZAJKOWSKI, ANTHONY F., (1960). Ph.D., Fordham. Administrative Officer, United States Government. Taught at Fordham and St. Louis. (Social Sciences)

DALTON, ALBERT, (1954). Ph.D., Harvard. Psychologist—Electron Microscopist, National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at College of the City of New York, Harvard, Johns Hopkins, McGill, and Western Reserve. (NIH)

DALY, JOSEPH F., (1941). Ph.D, Princeton. Chief Mathematical Statistician, Bureau of the Census, Department of Commerce. Taught at Catholic, Princeton, and Stanford. (Mathematics and Statistics)

DARLING, THOMAS G., (1956). B.A., Michigan State Normal. Training Officer (General), Division Training Center, Plant Quarantine Division, Agricultural Research Service, USDA. (Biological Sciences)

DAVIES, DAVID R., (1960). Ph.D., Oxford. Visiting Scientist, Section on Physical Chemistry, Laboratory of Neurochemistry, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

DAVIS, C. EDWIN, (1954). M.A., Texas. Assistant Director, Personnel Division, Farmers Home Administration, USDA. (Committee on Correspondence Study and Extension Education)

DAVIS, DORLAND J., JR., (1959). D.P.H. and M.D., Johns Hopkins. Associate Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (Biological Sciences)

DAVIS, RAYMOND, (1946). Consultant, Optics and Metrology Division, National Bureau of Standards, Department of Commerce. *Retired.* (Technology)

DEEL, ESTHER, (1954). B.S., Winthrop. Special Assistant to Associate Director for Extramural Programs, National Institutes of Health, Department of Health, Education, and Welfare. Taught in Public Schools, Chesterfield, South Carolina. (NIH)

DEES, BOWEN C., (1959). Ph.D., New York. Assistant Director for Scientific Personnel and Education, National Science Foundation. Taught at Massachusetts Institute of Technology, Mississippi, New York, and Rensselaer Polytechnic. (Physical Sciences)

DELANEY, MAURICE S. A., (1948). Head, Reconstruction Branch, Division of Chart Construction, U. S. Hydrographic Office, Department of the Navy. (Technology)

de la ROSA, O. A., (1953). M.S., Catholic. Head Architect, Bureau of Yards and Docks, Department of the Navy. (Technology)

DEVAUGHAN, WILLIAM A., (1954). Assistant to the Director for Employee Incentive Program, Personnel Division, Agricultural Research Service, USDA. (Committee on Correspondence Study and Extension Education)

DE VRIES, P. H., (1949). M.A., Michigan. Chief, Price Support and Commodity Operations Branch, Information Division, Commodity Stabilization Service, USDA. Taught at Michigan State. (Committee on Publications)

DEXTER, WAYNE V., (1950). B.S., Kansas State. Information Specialist, Office of the Deputy Administrator, Agricultural Marketing Service, USDA. (Committee on Information)

DILL, HENRY W., JR., (1960). B.A., Union. Agriculturist, Airphoto Analysis Unit, Land and Water Research Branch, Farm Economics Research Division, Agricultural Research Service, USDA. Taught at Union. (Technology)

DIX, WALTER S., (1952). Civil Engineer, Tennessee Valley Authority. (Technology)

DOLAN, MARIE A., (1959). M.A., American. Publications Writer, International Press Service, Far East, U. S. Information Agency. Taught at Immaculata Junior College. (Languages and Literature)

DOMBROWSKI, HENRY M., (1957). Photomechanical Supervisor, Soil Conservation Service, USDA. (Technology)

DOMINICK, HOWARD B., (1957). B.S., Clemson; Diploma, Fontainbleau School of Fine Arts (France). Assistant Project Coordinator, Project Coordination Staff, Office of Design and Construction, Public Buildings Service, General Services Administration. (Technology)

DONOGHUE, JOHN F., (1959). LL.B., George Washington. Attorney Adviser, Office of the General Counsel, USDA. (Correspondence)

DONOVAN, HENRY A., (1941). Deputy Executive Assistant Administrator for Management, Agricultural Research Service, USDA. *Retired.* (Office Techniques)

DORN, HAROLD F., (1948). Ph.D., Wisconsin. Chief, Biometrics Research Branch, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. (Mathematics and Statistics)

DOUGLASS, RAYMOND C., (1957). Ph.D., Stanford. Geologist, U. S. Geological Survey, Department of the Interior. Taught at American and Stanford. (Physical Sciences)

DREIS, THELMA A., (1952). Ph.D., American. Nutrition Programs Officer, Institute of Home Economics, Agricultural Research Service, USDA. (Correspondence)

DRESSEL, HELEN, (1959). Instructor, Fort Myers, U. S. Army. (Office Techniques)

DUNN, CARLOS R., (1957). M.S., Chicago. Meteorologist, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)

DURBIN, CHARLES G., (1960). D.V.M., Pennsylvania. Veterinary Medical Director, Food and Drug Administration, Department of Health, Education, and Welfare. (Biological Sciences)

DWYER, EDMUND D., (1957). LL.B., Georgetown. Chief, Navy Management Office, Department of the Navy. (Public Administration)

EDSALL, GEOFFREY, (1956). M.D., Harvard. Director, Communicable Disease Division, Walter Reed Army Institute of Research. Visiting Lecturer, Harvard School of Public Health. Taught at Boston. (Biological Sciences)

EDWARDS, GENIANA R., (1950). M.A., George Washington. Supervisory Publications Editor, Foreign Agricultural Service, USDA. (Languages and Literature)

EISENBERG, PHILIP, (1959). M.A., Columbia. Research Analyst, Air Research Division, Library of Congress. Taught at New York. (Languages and Literature)

ELDRIDGE, FRANK R., (1959). *Retired.* Taught at Columbia, Georgetown, George Washington, and New York. (Social Sciences)

ELLER, JEROME N., (1953). B.A., St. John's. Administrative Assistant to Representative Marshall of Minnesota, U. S. House of Representatives. (Public Administration)

ELLINGHAUSEN, HERMAN C., (1955). Ph.D., Maryland. Research Bacteriologist, Animal Disease and Parasite Research Division, Agricultural Research Service, USDA. Taught at Maryland. (NIH)

ELLINGWOOD, CECIL, (1957). B.S., New Hampshire. Mathematician, U. S. Coast and Geodetic Survey, Department of Commerce. (Technology)

ELLIS, N. R., (1952). M.S., Wisconsin. Associate Director, Animal Husbandry Research Division, Agricultural Research Service, USDA. (Agricultural Research Center Committee and Biological Sciences)

ELLIS, WILLIAM N., (1957). M.S., Hawaii. Physical Science Administrator, National Science Foundation. Taught at Hawaii and Vermont. (Mathematics and Statistics)

ENFIELD, GEORGE H., (1955). M.S., Purdue. Extension Agronomist, Federal Extension Service, USDA. (Social Sciences)

ENNEIS, JAMES M., (1957). M.S., Georgia. Supervisory Psychodramatist, St. Elizabeths Hospital, Department of Health, Education, and Welfare. Taught at Georgia. (Public Administration)

ERHARDT, F. L., (1955). M.A., American. Assistant Chief of Publications, Office of Information, USDA. Taught at North Dakota. (Languages and Literature)

ESTEN, RANDALL D., (1950). M.S., Syracuse. Assistant Chief, Map Compilation Branch, U. S. Army. Engineer Research and Development Laboratory. Taught at Syracuse. (Mathematics and Statistics and Technology)

EVANS, W. DUANE, (1941). B.S., Clarkson College of Technology. Assistant Commissioner, Bureau of Labor Statistics, Department of Labor. Taught at American. (Mathematics and Statistics)

EVERETT, GEORGE H., (1946). C.E., Clarkson College of Technology. Civil Engineer, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at American Institute, Bolivia. (Technology)

EYSENBURG, MAURICE H., (1956). Art Institute of Chicago. Illustrator, Department of State. Taught at Abbott Art School and Chicago. (Technology)

FELDMAN, DENNIS S., (1956). B.A., New York. Publications Editor, International Press Service, U. S. Information Agency. (Languages and Literature)

FERRARE, GEORGE D., (1959). B.S., Michigan State. Director, Division of Administrative Services, Forest Service, USDA. (Public Administration)

FINDLAY, JOSEPH P., (1947). B.A., George Washington. Chief, Programs and Standards Division, Office of Personnel, USDA. (Public Administration)

FINLATOR, JOHN H., (1959). B.A., North Carolina State. Director, Systems and Procedure, General Services Administration. Taught at Raleigh, North Carolina, Public Schools. (Public Administration)

FINNER, WINN F., (1946). Ph.D., Wisconsin. Chief, Market Structure and Costs Branch, Marketing Economics Research Division, Agricultural Marketing Service, USDA. (Social Sciences)

FITZPATRICK, RICHARD S., (1947). Ph.D., American. Chief, Special Reports Staff, Research Library Division, Office of Research and Analysis, U. S. Information Agency. Taught at American. (Social Sciences)

FLAVIN, THOMAS J., (1946). LL.B., Georgetown. Judicial Officer, Office of the Secretary, USDA. Taught at Georgetown. (Public Administration)

FLETCHER, HEWITT G., (1954). Ph.D., Massachusetts Institute of Technology. Chief, Section on Carbohydrates, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

FLORY, EVAN L., (1954). Ph.D., Nebraska. Chief, Branch of Land Operations, Bureau of Indian Affairs, Department of the Interior. (Technology)

FONDREN, JAMES P., (1954). B.S.C.E., Arkansas. Cartographer, Soil Conservation Service, USDA. (Technology)

FONFARA, EDWARD W., (1950). Cartographer, U. S. Hydrographic Office, Department of the Navy. (Technology)

FOSTER, JACK H., (1958). M.A., Michigan. Director of Personnel, Arlington County, Virginia. (Public Administration)

FOSTER, WILLIAM A., (1955). M.S., University of the State of New York. Head, Bathymetric Section, U. S. Hydrographic Office, Department of the Navy. (Technology)

FOTHERGILL, LEROY, (1958). M.D., Harvard. Scientific Adviser, Fort Detrick, Army Chemical Corps, Department of the Army. Taught at Harvard Medical and Naval Medical. (Biological Sciences)

FRETTS, CARL A., (1946). B.S., Pittsburgh. C.P.A. Assistant Manager, Federal Crop Insurance Corporation, USDA. Taught at Pittsburgh. (Committee on Internal Audit)

FRIED, MAURICE, (1953). Ph.D., Purdue. Soil Scientist, Agricultural Research Service, USDA. Taught at Purdue. (Languages and Literature)

FRIEDMAN, S. J., (1955). B.S., George Washington. Executive Vice President, O.M.I. Corporation of America, Alexandria, Virginia. (Technology)

FRIEDMAN, WILLIAM, (1956). B.S., Queens. Training Officer (Nematology), Division Training Center, Plant Quarantine Division, Agricultural Research Service, USDA. (Biological Sciences)

FUCHS, ROBERT H., (1949). B.A., American. Accountant. (Office Techniques and Public Administration)

FULCHER, JANE M., (1959). B.A., Wellesley; M.S. in L.S., Catholic. Medical Librarian, Washington Hospital Center. (Languages and Literature)

GAASTERLAND, KATHRINE WILKEY, (1948). M.A., Columbia. Teacher, Montgomery Blair High School, Silver Spring, Maryland. Taught at Chattanooga Public Schools and State Teachers College (Indiana, Pennsylvania). (Office Techniques)

GAMBLE, ALLEN O., (1960). Ph.D., California. Manpower Evaluation and Development Officer, Personnel Division, National Aeronautics and Space Administration. Taught at American. (Physical Sciences)

GANTT, PAUL H., (1958). J.U.D., Vienna; B.C.L., William and Mary. Chairman, Board of Contract Appeals, Department of the Interior. Taught at William and Mary. (Public Administration)

GARDNER, KELSEY B., (1956). M.B.A., Harvard. Director, Management Services Division, Farmer Cooperative Service, USDA. (Office Techniques)

GARNETT, JOHN R., (1957). B.S., Virginia. Chief, Branch of Emplyoment, Division of Personnel Management, Office of the Secretary, Department of the Interior. Taught at Lyceé Carnot (Dijon, France). (Public Administration)

GASS, SAUL I., (1954). M.A., Boston. Senior Mathematician, Federal Systems Division, International Business Machines. (Mathematics and Statistics)

GAUL, ROY D., (1959). M.S., Texas A. and M. Physical Oceanographer, U. S. Hydrographic Office, Department of the Navy. Taught at Texas A. and M. (Physical Sciences)
GEBLER, CHARLES J., (1959). M.S., Michigan. Supervisory Park Naturalist, National Capital Parks, National Park Service, Department of the Interior. (Biological Sciences)
GEHRING, J. H., (1949). C.E., Rutgers. Branch Manager, Bureau of Weapons Division, Bureau of Yards and Docks, Department of the Navy. (Technology)
GEISSER, SEYMOUR, (1956). Ph.D., North Carolina. Mathematician, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
GELMAN, ROBERT M., (1960). M.A., Catholic. Administrator. Taught at American and Georgetown. (Social Sciences)
GEORGE, CATHERINE F., (1956). B.A., Maine. Publications Editor, Publications Division, Office of Information, USDA. (Languages and Literature)
GEORGE, JAMES, (1960). B.S., Massachusetts Institute of Technology. Engineer in Charge of Aerial Targets and Special Problems, Bureau of Weapons, Department of the Navy. (Mathematics and Statistics)
GERALD, JOHN O., (1959). B.S., Clemson. Agricultural Economist, Marketing Economics Research Division, Agricultural Marketing Service, USDA. (Social Sciences)
GERRA, MARTIN J., (1958). M.A., Catholic. Statistician, Agricultural Economics Division, Agricultural Marketing Service, USDA. (Social Sciences)
GERRETSON, FRED W., (1954). Ph.B., Wisconsin. Government Representative for Photo Products Departments, E. I. du Pont de Nemours and Company. (Technology)
GIBSON, G. G., (1960). M.S., Iowa. Chief and Agricultural Extension Specialist, Agricultural Institutions Branch, Office of Food, International Cooperation Administration, Department of State. (Social Sciences)
GILLILLAND, CORA LEE C., (1960). M.A., Chicago. Taught in Trust Territory of the Pacific Islands. (Technology)
GILSTRAP, MARGUERITE, (1948). B.S.E., Arkansas. Information Specialist, Agricultural Research Service, USDA. (Languages and Literature)
GOODE, EDWIN R., JR., (1959). D.V.M., Auburn. Assistant Director, Animal Disease and Parasite Research Division, Agricultural Research Service, USDA. (Biological Sciences)
GOODSELL, WYLIE D., (1939). Ph.D., Iowa State. Assistant Branch Chief, Cost, Income, and Efficiency Branch, Agricultural Research Service, USDA. Taught at Iowa State. (Social Sciences)
GOODYEAR, HUGO V., (1960). B.S., Tampa. Meteorologist (Research), U. S. Weather Bureau, Department of Commerce. Taught at Florida and Tampa. (Physical Sciences)
GRANAHAN, DAVID M., (1957). Minneapolis School of Art, Traveling Scholarship. Chief, Exhibit Service, Office of Information, USDA. (Languages and Literature)
GRANT, CHARLES L., (1943). Director of Finance and Budget Officer, USDA. (Public Administration)
GREEN, FOREST H., (1959). M.S.C.E., Purdue. Design Engineer, Bureau of Public Roads Department of Commerce. (Technology)
GREEN, JOSEPH, JR., (1957). M.A., Boston College. Management Group of the Office of Training Services, National Security Agency. (Social Sciences)
GREENBLATT, CHARLES L., (1959). M.D., Pennsylvania. Research Biologist, Laboratory of Physical Biology, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
GUIDRY, NELSON P., (1947). Geographer, Foreign Agricultural Service, USDA. (Mathematics and Statistics)
GUNTHER, V. SAMUEL, (1959). Head, Procurement Management Section, Procurement and Property Management Division, Office of Plant and Operations, USDA. (Office Techniques)
GUTENSON, OTTO, (1957). G.E., Cincinnati. Mechanical Engineer, Research and Instrument Design Branch, U. S. Geological Survey, Department of the Interior. Taugh at Chattanooga. (Technology)

HAFNER, RALPH A., (1960). B.A., American. Operations Analyst, Operations Research Office, Johns Hopkins University. Taught at Camp Holabird. (Mathematics and Statistics)
HAGOOD, MARGARET J., (1943). Ph.D., North Carolina; Honorary D.Sc., Queens (North Carolina). Chief, Farm Population and Rural Life Branch, Agricultural Marketing Service, USDA. Taught at North Carolina and Wisconsin. (Mathematics and Statistics and Social Sciences)
HALL, DAVID G., (1954). M.S., Kansas State. Chief, Publications Branch, Information Division, Agricultural Research Service, USDA. Taught at Arkansas. (Committee on Information)
HALL, FOREST J., (1955). B.Litt., Notre Dame. Information Specialist, Agricultural Marketing Service, USDA. (Committee on Publications)
HALL, ROBERT T., (1948). M.S., Oregon. Chief, Editorial Branch, Division of Information and Education, Forest Service, USDA. (Committee on Publication)
HALLIGAN, DONALD K., (1959). Meteorologist, U. S. Weather Bureau, Department of Commerce. Taught at Weather Bureau. (Physical Sciences)
HALSMAN, JULIUS, (1955). Chief, Photography Division, Armed Forces Institute of Pathology. (Technology)
HAMM, JOSEPH F., (1954). B.C.S., Columbus. Head, Lithographic Section, Soil Conservation Service, USDA. (Technology)
HAND, WALTER H., (1960). B.A., Central. Special Staff Assistant in Personnel Administration, Department of the Navy. (Public Administration)
HANSEN, MORRIS H., (1939). M.A., American. Assistant Director for Statistical Standards, Bureau of the Census, Department of Commerce. Taught at American. (Mathematics and Statistics)
HARMAN, SUSAN E., (1937). Ph.D., Johns Hopkins. Professor of English, University of Maryland. Taught at Nebraska State Teachers College (Peru). (Languages and Literature)
HARMON, JAMES O., (1950). M.A., Maryland. Contract Administrator, ACF Electronics Divisions, ACF Industries, Inc. Taught at Maryland and Montgomery Junior College. (Languages and Literature)

HARRIS, WILLIAM S., (1946). M.S., Columbia. Chief, Paperwork Control Branch, Office of Records Management, National Archives and Records Service, General Services Administration. (Office Techniques)

HARVEY, WALTER R., (1957). Ph.D., Iowa State. Biometrician, In Charge Livestock Research Staff, Biometrical Services, Agricultural Research Service, USDA. Taught at Idaho and Iowa State. (Mathematics and Statistics)

HASEL, AUSTIN A., (1951). B.S., Michigan. Research Forester, Forest Service, USDA. (Mathematics and Statistics)

HASENCLEVER, HERBERT, (1957). Ph.D., Iowa. Senior Assistant Scientist, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Iowa. (NIH)

HAUPTMAN, ROBERT, (1954). B.E.E., College of the City of New York. Electronic Systems Engineer, Glenn L. Martin Co. Taught at Rehrig Radio Institute and Capitol Radio Engineering Institute. (Technology)

HEARNE, CANNON C., (1948). M.S., Wisconsin. Director, Foreign Training Division, Foreign Agricultural Service, USDA. (Committee on Correspondence Study and Extension Education and Social Sciences)

HEFTMANN, ERICH, (1954). Ph.D., Rochester. Biochemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare Taught at Maryland and Rochester. (NIH)

HENDEE, CLARE, (1957). B.S., Michigan State. Assistant Chief for Administration, Forest Service, USDA. (Public Administration)

HENDERSON, HANFORD M., (1959). M.A., North Carolina. Lecturer, American University. Taught at Maryland, North Carolina, and Pisa (Italy). (Technology)

HENSCHEL, RICHARD, (1954). B.S., Ursinus. Assistant Executive Officer, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

HENSLEY, MARTHA L., (1950). M.S., Kansas State. Home Economist, Agricultural Research Service, USDA. Taught at Illinois and Montana State. (Technology)

HERRELL, HENRY G., (1957). LL.B., George Washington. Assistant Administrator for Management, Agricultural Marketing Service, USDA. (Special Programs and Public Administration)

HERTZ, GUSTAV C., (1959). B.S., American. Public Administration Adviser, Public Administration Division, International Cooperation Administration, Department of State. (Public Administration)

HESS, SIDNEY M., (1950). Ph.D., Georgetown. Pharmacologist, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. (Physical Sciences)

HICKEY, THOMAS J., (1943). LL.M., Columbus. Comptroller, Bureau of Medicine and Surgery, Department of the Navy. (Office Techniques)

HILBERT, G. E., (1950). Ph.D., Yale. Director, Foreign Research and Technical Programs Division, Agricultural Research Service, USDA. (Public Administration)

HILL, BERTON F., (1959). B.A., Brown. Executive Secretary, Institute of Laboratory Animal Resources, National Research Council. (Biological Sciences)

HILSENRATH, JOSEPH, (1957). M.A., Montclair State Teachers College. Chief, Equation of State Section, Heat Division, National Bureau of Standards, Department of Commerce. (Physical Sciences)

HODGES, EARL F., (1958). M.S., South Dakota State. Agricultural Economist, Farm Economics Research Division, Agricultural Research Service, USDA. Taught at Sioux Falls. (Social Sciences)

HOFFMAN, JOSEPH E., (1959). Ph.D., Princeton. Physiologist, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

HOFFMANN, CLARENCE H., (1955). Ph.D., Minnesota. Assistant Director, Entomology Research Division, Plant Industry Station, USDA. Taught at Minnesota. (Agricultural Research Center Committee and Biological Sciences)

HOGAN, MARVIN P., (1960). LL.B., North Carolina. Librarian, Department of Justice. (Languages and Literature)

HOIBERG, HANS S., (1949). M.A., Columbia. Head, Training Section, Personnel Division, Rural Electrification Administration, USDA. (Committee on Correspondence Study and Extension Education)

HOOKS, LANCE, (1956). Head, Livestock Marketing Program Group, Marketing Information Division, Agricultural Marketing Service, USDA. (Committee on Information)

HORD, WARNER H., (1945). M.B.A., Harvard. Chief, Office of Carrier Accounts and Statistics, Civil Aeronautics Board. Taught at Tulane. (Public Administration)

HORWITZ, WILLIAM, (1951). Ph.D., Minnesota. Chief, Food Research Branch, Division of Food, Bureau of Biological and Physical Sciences, Food and Drug Administration, Department of Health, Education, and Welfare. (Physical Sciences)

HOUGHTON, HARRISON F., (1958). B.C.S., Drake. Business Economist, Antitrust Division, Department of Justice. Taught at Washington Society of Cinematographers Institute. (Technology)

HOUSEMAN, EARL E., (1951). M.S., South Dakota. Director, Statistical Standards Division, Agricultural Marketing Service, USDA. Taught at Iowa State. (Mathematics and Statistics)

HOWARD, JAMES O., (1960). Ph.D., Iowa. Director, Foreign Trade Promotion Division, Foreign Agricultural Service, USDA. Taught at Duke and Iowa. (Social Sciences)

HUBBARD, HENRY F., (1955). Ph.D., George Washington. Personnel Officer, District of Columbia Government. Taught at George Washington. (Public Administration)

HUBERT, LESTER F., (1955). M.S., Chicago. Meteorologist, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)

HUDDLESTON, HAROLD F., (1956). M.A., Michigan State. Mathematical Statistician, Agricultural Marketing Service, USDA. Taught at Michigan State. (Mathematics and Statistics)

HURWITZ, WILLIAM N., (1941). M.A., Columbia. Chief, Statistical Research Division, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)

JACKSON, SETH, (1957). B.S., Cornell. Chief, Branch of Safety and Employee Relations, Forest Service, USDA. Chairman, Education Committee, Washington Section, American Society of Safety Engineers. Chairman, Society of American Foresters' Committee on Safety and Federal Safety Council's Program and Services Division. (Correspondence)

JAFFE, ERWIN, (1947). Ph.D., Harvard. Chief, Aeronautical Reference Branch, Administrative Services Division, Office of Management Services, Federal Aviation Agency. Taught at Harvard. (Languages and Literature)

JAKOBY, WILLIAM B., (1958). Ph.D., Yale. Biochemist, National Institute of Arthritis and Metabolic Diseases. National Institutes of Health, Department of Health, Education, and Welfare. Taught at New York University School of Medicine. (NIH)

JEBENS, ARTHUR B., (1953). J.D., Iowa. Director of Management Research, Office of the Secretary, Department of the Interior. (Public Administration)

JENKINS, CHARLES I., (1955). LL.B., National; C.P.A. Chief, Division of Accounting, Office of Budget and Finance, USDA. (Public Administration)

JESSEL, J. J. A., (1942). D.Sc., Harvard. Head, Transmission and Coordination Section, Bureau of Power, Federal Power Commission. Taught at Harvard. (Technology)

JEX, GARNET W., (1955). M.F.A., George Washington. Chief, Graphics Section, Bureau of State Services, U. S. Public Health Service, Department of Health, Education, and Welfare (Technology)

JOBANEK, WILLIAM L., (1959). M.B.A., George Washington. Staff Officer, Director of Logistics, Joint Chiefs of Staff, Department of Defense. Taught at American. (Mathematics and Statistics)

JOHNSON, DAVID F., (1958). Ph.D., Georgetown. Chemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

JOHNSON, SHERMAN E., (1937). Ph.D., Harvard. Chief Economist, Agricultural Research Service, USDA. Taught at Minnesota, Montana State, and South Dakota State. (Social Sciences)

JOHNSTON, MARJORIE C., (1942). Ph.D., Texas. Specialist for Foreign Languages, Science, Mathematics, and Foreign Languages Section, Office of Education, Department of Health, Education, and Welfare. Taught at George Washington, San Diego State, Stephens, and Texas. (Languages and Literature)

JONES, ALLEN H., (1957). M.A., Temple. Head, Department of English, Montgomery Junior College. Taught at Girard, Montgomery Junior College, and Muhlenberg. (Languages and Literature)

JORDY, GEORGE Y., (1958). M.B.A., Pennsylvania. Economist, Economics Branch, Office of Operations Analysis and Forecasting, U. S. Atomic Energy Commission. (Mathematics and Statistics)

JOSEPHSON, HORACE R., (1949). Ph.D., California. Director, Division of Forest Economics Research, Forest Service, USDA. Taught at California. (Social Sciences)

KAHN, HAROLD A., (1960). M.A., American. Mathematical Statistician, Office of the Director, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

KAUFHOLZ, FERDINAND, (1949). B.C.E., Johns Hopkins. Deputy Assistant Commissioner for Design and Construction, Public Buildings Service, General Services Administration. (Technology)

KAUFMAN, MILTON, (1940). M.S., College of the City of New York. Statistician, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)

KEIM, S. D., (1960). B.S., Maryland. Chief Engineer, Marine Corps and Amphibious Branch, Electronics Division, Bureau of Ships, Department of the Navy. (Technology)

KELLER, GEORGE H., (1960). M.A., Utah. Oceanographer, U. S. Hydrographic Office, Department of the Navy. (Physical Sciences)

KENNY, HAMILL, (1960). Ph.D., Maryland. Instructor, English Department, University of Maryland. Taught at Columbia and Maryland. (Languages and Literature)

KETY, SEYMOUR S., (1954). M.D., Pennsylvania. Chief, Laboratory of Clinical Science, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Pennsylvania. (NIH)

KILPATRICK, FRANKLIN E., (1960). Ph.D., Princeton. Senior Staff Member, The Brookings Institution. Taught at Princeton. (Social Sciences)

KIMLER, ALEXANDER, (1960). Ph.D., Vanderbilt. Supervisory Bacteriologist, Laboratory Aids Branch, Division of Research Services, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Miami School of Medicine. (NIH)

KING, J. E., (1948). Special Staff Assistant to the Director of Engineering, Division of Engineering, Forest Service, USDA. (Technology)

KIRKHAM, MARK M., (1954). Graduate study, University of Chicago. Administrative Assistant, Office of the Secretary, USDA. (Office Techniques and Public Administration)

KLEIN, WILLIAM H., (1957). M.S., Massachusetts Institute of Technology. Meteorologist, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)

KNAPP, JOSEPH, JR., (1960). B.A., Southeastern. Accountant, Western Area, Rural Electrification Administration, USDA. (Social Sciences)

KNIPLING, EDWARD F., (1954). Ph.D., Iowa State. Director, Entomology Research Division, Agricultural Research Service, USDA. (Biological Sciences)

KOCH, E. JAMES, (1953). M.S., North Carolina State. Biometrician, Agricultural Research Service, USDA. (Biological Sciences)

KOEBEL, RALPH F., (1943). S.J.D., Georgetown. Assistant General Counsel, Office of the General Counsel, USDA. (Public Administration)

KOFFSKY, NATHAN M., (1954). M.A., American. Deputy Administrator, Agricultural Research Service, USDA. (Social Sciences)

KOMINUS, NICHOLAS A., (1960). B.S., Kansas State. Information Specialist, Agricultural Marketing Service, USDA. (Languages and Literature)

KONKLE, WARD W., (1960). B.A., Pittsburgh. Head, Technical Publications Section, Information Division, Agricultural Research Service, USDA. Taught at Wooster High School (Ohio). (Languages and Literature)

KOTEEN, JACK, (1957). B.A., New York. Deputy Chief, Training Branch, International Cooperation Administration, Department of State. Taught at American. (Public Administration)

KOZAK, KATHRYNE B., (1957). Naval Research Laboratory, Department of the Navy. (Languages and Literature)

KRASSENSKY, MARINA, (1960). M.A., Belgrade (Yugoslavia). Senior Research Analyst, Air Research Division, Library of Congress. Taught in Virginia Public Schools. (NIH)

KREBS, LEO B., (1960). Ink Chemist, Capitol Printing Ink Company, Silver Spring, Md. (Technology)

KRIESBERG, MARTIN, (1952). Ph.D., Harvard. Marketing Specialist. Agricultural Marketing Service, USDA. Adjunct Lecturer, American University. Taught at Michigan. (Public Administration)

KRUEGER, LOUISE M., (1946). M.A., George Washington. Chief, Fiscal Operations, Policies and Methods Section, Division of Accounting, Office of Budget and Finance, USDA. Taught at George Washington. (Office Techniques)

KUSNER, JOSEPH H., (1949). Ph.D., Pennsylvania. Special Assistant, Executive Office, Office of Chief of Ordnance, Department of the Army. Taught at Florida and Pennsylvania. (Mathematics and Statistics)

LANDO, ROBERT H., (1947). M.A., California. Records Management Officer, Agricultural Marketing Service, USDA. (Office Techniques)

LANE, IRA A., (1954). B.S., New York State College of Forestry. In Charge, Division Training Center, Plant Quarantine Division, Agricultural Research Service, USDA. (Biological Sciences)

LANGLEY, VERMA R., (1959). M.A., American. Correspondence Examiner, Secretariat, U. S. Information Agency. Taught at Public Schools of Oklahoma. (Social Sciences)

LAXTON, WILLIAM C., (1946). B.A., George Washington. Director, Personnel Division, Agricultural Marketing Service, USDA. (Public Administration)

LAZZARI, PIETRO, (1944). Master Artist, Ornamental School of Rome. Belle Arti. Portrait artist, landscape painter, and graphic designer. Fulbright Research in Art Media and Technique. Taught at American and Beaux Arts Institute of Design, New York. (Technology)

LEARMOUTH, ROBERT, (1954). B.C.S., Southeastern. Executive Officer, National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

LE CLERG, E. L., (1949). Ph.D., Minnesota. Director, Biometrical Services Division, Agricultural Research Service, USDA. (Biological Sciences and Correspondence)

LEDERER, MARIANNE, (1947). Lehramtspreufung, University of Vienna. Taught in the secondary and higher schools of Vienna. (Languages and Literature)

LEEDY, DANIEL L., (1950). Ph.D., Ohio State. Chief, Branch of Wildlife Research, Fish and Wildlife Service, Department of the Interior. (Biological Sciences)

LEFEBVRE, R. J., (1946). B.Ch., New York. Chief, State Service Office. (Technology)

LEICH, HAROLD H., (1946). M.A., American. Chief, Program Planning Division, Civil Service Commission. (Public Administration)

LEIKIND, MORRIS, (1953). M.S., Ohio State. Executive Secretary, Neurology Post Graduate Training Committee, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Department of Health, Education, and Welfare. Special Lecturer in History of Microbiology, George Washington. (NIH)

LENTZ, PAUL L., (1958). Ph.D., Iowa. Mycologist, Plant Industry Station, Agricultural Research Service, USDA. Taught at Butler and George Washington. (NIH)

LEVENBERG, MARVIN H., (1955). M.C.S., Southeastern. Supervisory Auditor, Army Audit Agency, Department of the Army. (Public Administration)

LEWIS, EDWARD J., (1952). Chief, Records Administration Branch, Internal Revenue Service, Department of the Treasury. (Public Administration)

LEWIS, KEITH B., (1946). B.A., Georgia. Manager, Washington Office, Eastman Kodak Company. (Technology)

LINN, ALICE C., (1954). M.S., Kansas State. Extension Clothing Specialist, Federal Extension Service, USDA. (Social Sciences)

LIVINGSTON, ROBERT B., (1957). M.D., Stanford. Director of Basic Research, National Institute of Mental Health and National Institute of Neurological Diseases and Blindness, National Institutes of Health, Department of Health, Education, and Welfare. Taught at California and Yale Schools of Medicine. (NIH)

LOBB, JAMES H., (1954). B.S., Fordham. Supervisory Accountant, Civil Accounting and Auditing Division, General Accounting Office. (Public Administration)

LOFTUS, JOSEPH P., (1946). B.A., St. Mary's College. Director, Office of Administrative Management, USDA. (Public Administration)

LOGAN, CHARLES A., (1947). M.S., Kansas State. Superintendent, Agricultural Research Center Operations, USDA. Taught at Kansas State. (Agricultural Research Center Committee)

LOSEE, GARRIE J., (1958). B.A., Hofstra. Mathematical Statistician, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)

LUTTRELL, DOROTHY M., (1947). Records Manager, Internal Revenue Service, Department of the Treasury. (Office Techniques)

LYLE, MARY F., (1959). Ph.D., Wisconsin. Program Leader, 4-H and YMW Programs, Federal Extension Service, USDA. (Social Sciences)

LYMAN, JOHN, (1951). Ph.D., California. Associate Program Director for Earth Sciences, National Science Foundation. (Physical Sciences)

LYON, ROWLAND, (1946). M.A., George Washington. Curator—Art and Associate Curator—Restoration, National Collection of Fine Arts, Smithsonian Institution. Taught at George Washington. (Technology)

MAGNITZKY, A. WAYNE, (1954). M.S., Johns Hopkins. Deputy Head, Applied Oceanography Branch, U. S. Hydrographic Office, Department of the Navy. Taught at Tulane. (Physical Sciences)

MALKIN, WILLIAM, (1958). B.S., Minnesota. Meteorologist, Research and Development, U. S. Weather Bureau, Department of Commerce. Taught at D. C. Teachers, George Washington, Maryland, and Southeastern. (Mathematics and Statistics and Physical Sciences)

MANN, JOHN F., JR., (1960). B.S., Pennsylvania State. Applied Science Representative, International Business Machines. (Mathematics and Statistics)

MARSHALL, HERBERT G., (1946). Chief, Operations Appraisal Division, Headquarters, Army Audit Agency, Department of the Army. (Public Administration)

MARSHALL, HOWARD E., (1945). Director, Division of Budget and Finance, Forest Service, USDA. (Committee on Internal Audit)

MARTIN, DOROTHY M., (1958). B.A., Bates. Newswriter, Forest Service, USDA. Taught at Appleton Academy and Quimby School (New Hampshire). (Committee on Information)

MARTIN, LEALON E., (1954). B.A., Millsaps. Assistant Chief, Office of Research Information, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

MARTIN, W. HOWARD, (1956). Corcoran School of Art, Negative Work Supervisor, Cartographic Section, Soil Conservation Service, USDA. (Technology)

MASON, CHARLES N., (1943). M.A., Montana, Accountant. Taught at George Washington and Montana. (Public Administration)

MATERAZZI, ALBERT R., (1948). D.Ch., Rome. Technical Representative and Research Coordinator, Litho Chemical and Supply Company, Inc. (Technology)

MATTHEWS, ALBERT W., (1957). Chief, Photographic Services, Office of Information, USDA (Technology)

MATTHEWS, JOSEPH L., (1952). Ph.D., Chicago. Assistant Director, Division of Extension Research and Training, Federal Extension Service, USDA. (Social Sciences)

MAXWELL, ROBERT W., (1946). LL.B., Washington College of Law (American). C.P.A. Commissioner of Accounts, Bureau of Accounts, Department of the Treasury. (Public Administration)

MAY, EUGENE, (1952). Cartographer, Soil Conservation Service, USDA. (Correspondence)

MCADAMS, TERRY J., (1958). George Washington. Assistant Director, Office of Plant and Operations, USDA. (Office Techniques)

MCCLARREN, J. KENDALL, (1946). Assistant Director, Office of Information, USDA. (Languages and Literature)

MCCLEARY, ROBERT T., (1959). B.S.C., Temple. C.P.A. Assistant Director, Internal Audit Staff, Agricultural Research Service, USDA. (Committee on Internal Audit)

MCCORMICK, JAMES H., (1946). M.S., Georgetown. Assistant Director, Office of Information, USDA. (Committee on Publications and Languages and Literature)

MCCULLOUGH, NORMAN B., (1954). Ph.D., M.D., Chicago. Chief, Laboratory of Bacterial Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Chicago, Detroit Institute of Technology, Georgetown, and Michigan State. (NIH)

MCDANIEL, PAUL, (1959). Ph.D., Indiana. Deputy Director, Division of Research, U. S. Atomic Energy Commission. Taught at Alabama. (Physical Sciences)

MCDONALD, WILLIAM T., (1955). M.A., Arkansas. Assistant Director for Interagency Programs, Office of Career Development, Civil Service Commission. (Public Administration)

MCGERR, PATRICIA, (1951). M.S., Columbia School of Journalism. Writer and Novelist. (Languages and Literature)

MCHENRY, WILLIAM C., (1948). Assistant Production Manager, Operations Research Office, Johns Hopkins. (Technology)

MCKENNA, DUANE A., (1952). B.F.A., South Dakota. Staff Artist, *U.S. News & World Report*. (Technology)

MCMILLAN, DOUGLAS J., (1959). M.A., Maryland. Library Assistant, University of Maryland. Taught at Maryland. (Languages and Literature)

MEHLER, ALAN H., (1954). Ph.D., New York. Chemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Chicago and New York. (NIH)

MERCREADY, ROBERT B., (1955). B.S., Rutgers. Geographer, Office of the Chief of Naval Operations, Department of the Navy. Taught at Maryland. (Technology)

MERRITT, ALBERT R., (1957). Technologist (Photographic Equipment), Photographic Center, Department of the Navy. (Technology)

MILEHAM, HARRY P., (1947). M.A., Columbia. Chief of Publications, Office of Information, USDA. (Committee on Publications and Languages and Literature)

MILLER, LOWELL E., (1951). J.D., State University of Iowa. Attorney, Office of the General Counsel, USDA. (Correspondence)

MILLER, MARTIN H., (1955). M.A., Western Reserve. National Sales Representative, Savings Bonds Division, Department of the Treasury. Winner of many prizes and trophies for excellence in photography. (Technology)

MILLER, NORMA RENO, (1958). M.S., Wisconsin. Independent Public Relations Counselor. Taught at Maryland and Pittsburgh. (Languages and Literature)

MIMMS, O. L., (1960). M.S., Iowa. Chief, Agricultural Training Division, International Cooperation Administration, Department of State. Taught at Idaho and Montana State. (Social Sciences)

MINOR, WILLIAM A., (1946). B.S.A., Georgia. Assistant Administrator for Management, Foreign Agricultural Service, USDA. (Public Administration)

MITCHELL, EUGENE B., (1959). M.S., Massachusetts Institute of Technology. Lt. Commander, U. S. Navy and Project Coordinator, Bureau of Ships, Design Division, Hall Design Branch, Department of the Navy. Taught at Maryland, Vallejo Junior College, Virginia, and William and Mary. (Mathematics and Statistics)

Mohrhardt, Foster E., (1955). M.A., Michigan. Director, Library, USDA. (Languages and Literature)
Mora, Peter T., (1958). Ph.D., Budapest. Head, Micromolecular Chemistry Section, Laboratory of Chemical Pharmacology, National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
Morgan, Emma, (1958). Cortland Teachers. Chief Housekeeper, D. C. General Hospital. Member of National Board of National Executive Housekeepers Association. (Technology)
Morris, Alan D., (1959). D.Eng., Johns Hopkins. Research Engineer, Operations Research, Inc., Silver Spring, Maryland. Taught at American. (NIH)
Morrison, Donald F., (1957). M.A., Boston. Mathematical Statistician. Biometrics Branch, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
Morville, Giovanna, (1959). Naples. ALITALIA Italian Airlines. Taught at Foreign Service Institute. (Languages and Literature)
Mosettig, Erich, (1954). Ph.D., Vienna. Chief, Steroid Section, Laboratory of Chemistry, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taugh at Vienna and Virginia. (NIH)
Mouser, C. M., (1953). M.A., Louisiana State. Chief Clerk, Senate Committee on Agriculture and Forestry. Taught at Sam Houston State and Northwestern State. (Office Techniques)
Moyer, Eugene C., (1946). B.S., Georgetown. Practicing Certified Public Accountant; Adjunct Professor, American. (Public Administration)
Muckenfuss, Ralph S., (1958). M.D., Emory. Technical Director, Naval Medical Research Institute, National Naval Medical Center. (Biological Sciences)
Mulligan, J. Kenneth, (1959). M.A., Chicago. Director, Office of Career Development, Civil Service Commission. Taught at Boston. (Special Programs)
Muth, George E., (1960). LL.B., George Washington. Business Executive, George E. Muth Company, Inc., Washington, D. C. (Technology)
Myers, Charles T., Jr., (1955). Chief, Photography Division, Office of Information, USDA. (Technology)
Myrianthopoulos, Ntinos C., (1958). Ph.D., Minnesota. Geneticist, Epidemiology Branch, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Department of Health, Education, and Welfare. Taught at George Washington, Illinois, and Minnesota. (NIH)

Nelson, Lionel W., (1957). M.A., Stetson. Director, Public Relations and Speech Department, Montgomery Junior College. (Languages and Literature and NIH)
Nerboso, Salvatore, (1955). Ph.D., Harvard. Assistant Director of Libraries, University of Maryland. (Public Administration)
Nichols, A. J., (1956). D.P.A., Harvard. Assistant Director, Foreign Training Division, Foreign Agricultural Service, USDA. (Public Administration)
Nisselson, Harold, (1946). B.S., College of the City of New York. Mathematical Statistician, Office of Assistant Director for Statistical Standards, Bureau of the Census, Department of Commerce. Taught at American. (Mathematics and Statistics)
Nolan, James G., (1957). M.S., Columbia. Associate Chemist, Applied Physics Laboratory, Johns Hopkins. (Languages and Literature)
Nordenson, Tor, (1956). B.S., Michigan. Chief, Hydrologic Investigations Section, Hydrologic Services Division, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)
Nordin, Ruth, (1959). B.A., George Washington. Head, Publications and Editorial Section, Soil Conservation Service, USDA. Taught in Nebraska Public Schools. (Languages and Literature)
Novak, Alexander, (1956). Offset Photographer, Government Printing Office. (Technology)
Nystrom, Paul E., (1950). D.P.A., Harvard. Director of Extension, College of Agriculture University of Maryland. (Social Sciences)

O'Brien, James C., (1955). LL.B., Columbus. Director of Personnel, Department of Health, Education, and Welfare. (Public Administration)
Ogren, Kenneth E., (1958). Ph.D., Minnesota. Director, Marketing Economics Research Division, Agricultural Marketing Service, USDA. Taught at Minnesota. (Social Sciences)
Olsen, Willard G., (1960). B.S., American. Management Analyst, Administrative Office, National Archives and Records Service, General Services Administration. (Correspondence)
Olson, Kenneth W., (1952). M.A., Michigan. Director, Foreign Market Information Division, Foreign Agricultural Service, USDA. (Special Programs and Languages and Literature)
Ord, Alta M., (1958). Head, Institutional Housekeeping, Hannah Harrison School. *Retired.* (Technology)
Ornstein, Jacob, (1952). Ph.D., Wisconsin. Assistant Professor (On Leave), New Mexico A. and M. Taught at Catawba, Waldorf, and Wisconsin. (Languages and Literature)
Osborne, James G., (1953). B.S., California. Statistical Analyst, Forest Service, USDA. (Mathematics and Statistics)
Osgood, Frederic C., (1960). B.S., Oregon. Management Analyst, Directives Management Branch, Directives Systems Analysis Division, Commodity Stabilization Service, USDA. Taught at Oregon. (Office Techniques)
Otero, José, (1959). Madrid. Regional Office, World Health Organization. Taught at Uscuela Internacional and Waynesburg. (Languages and Literature)

Packard, Ross L., (1959). Ph.D., Wisconsin. Agricultural Statistician, Agricultural Estimates Division, Agricultural Marketing Service, USDA. Taught at American. (Social Sciences)
Paine, Howard C., (1957). B.A., Nebraska. Staff Accountant, Telephone Operations and Loans Division, Rural Electrification Administration, USDA. (Correspondence)

PALLANSCH, MICHAEL J., (1955). Ph.D., Minnesota. Supervisory Chemist, Eastern Utilization Research Branch, Agricultural Research Service, USDA. Taught at Georgetown. (Physical Sciences)

PATLAK, CLIFFORD S., (1959). Ph.D., Chicago. Mathematician (Mathematical Biology), Section on Theoretical Statistics and Mathematics, Biometrics Branch, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Chicago and Illinois Institute of Technology. (NIH)

PERLMAN, HERBERT L., (1959). LL.B., Columbia. Assistant to the Judicial Officer, Office of the Secretary, USDA. Taught at College of City of New York. (Public Administration)

PERLMUTTER, JEROME H., (1955). M.A., American. Chief, Editorial Section, Division of Publications, Office of Information, USDA. Taught at American. (Committee on Publications and Languages and Literature)

PETERSON, E. J., (1948). B.S., Wisconsin. Chief, Training and Safety Branch, Personnel Management Division, Soil Conservation Service, USDA. (Committee on Correspondence Study and Extension Education and Technology)

PHIFER, BRYAN M., (1958). M.A., Missouri. Chief, Publications and News Media Branch, Foreign Agricultural Service, USDA. Taught at Missouri. (Committee on Information)

PICKENS, JAMES, (1944). Technical Editor, Bureau of Plant Industry, Soils and Agricultural Engineering, USDA, *Retired*. Taught at Foyer du Soldat, France. (Correspondence)

PIKE, HOWLAND, (1950). District Manager, Government Sales, Ansco Division, General Aniline and Film Corporation. (Technology)

PIQUET, HOWARD S., (1939). Ph.D., Princeton. Senior Specialist in International Economics, Legislative Reference Service, Library of Congress. Taught at American, California, New York, Oregon, Princeton, and Washington. (Social Sciences)

POLLOCK, ROSS, (1946). M.A., George Washington. Assistant Director, Office of Career Development, Civil Service Commission. Taught at George Washington. (Public Administration)

PONCE, ODILÓN, (1952). Degree of Professor, University of Córdoba. Director, Columna de Washington, Press Service. Editor, Pan American Health Organization. Taught at Córdoba, Manchester, and North Carolina. (Languages and Literature)

POPE, EDWARD V., (1960). M.A., Pennsylvania. Extension Specialist in Child Development and Parent Education, Federal Extension Service, USDA. Taught at Cornell, George Washington, and Temple. (Social Sciences)

POPE, WILLIAM C., (1960). B.S. I.E., Northeastern. Registered Professional Engineer, District of Columbia. Chief, Branch of Safety Engineering, Division of Personnel Management, Office of Administrative Assistant Secretary, Department of the Interior. Taught at South American Universities. (Public Administration)

POPECKI, JOSEPH T., (1952). B.S.L.S., Catholic. Assistant Director of Libraries, Catholic University. Taught at Catholic. (Languages and Literature)

PORTER, WARD F., JR., (1955) Ph.D., Harvard. Extension Analyst, Federal Extension Service, USDA. Taught at Colorado State, Michigan State, West Virginia, and Wisconsin. (Social Sciences)

POTTER, WILLIAM D., (1952). M.S., Cornell. Hydraulic Engineer, Hydraulic Research Division, Bureau of Public Roads, Department of Commerce. (Technology)

PRESTON, JOHN F., (1951). M.S.F., Michigan. Chief of Forestry Division, Soil Conservation Service, USDA, *Retired*. (Correspondence)

PRICE, H. WALTER, (1953). B.S., Drexel Institute of Technology. Electronic Engineer, Diamond Ordnance Fuse Laboratories. (Technology)

PRITZKER, DOROTHY P., (1956). B.A., Kentucky. Employee Development Officer, Bureau of the Census, Department of Commerce. (Languages and Literature)

PURDY, ELBRIDGE C., (1943). Master of Photography. Division of Photography, Office of Information, USDA. *Retired*. (Technology)

PURVES, C. M., (1926). M.A., Minnesota. Director of Statistics, Foreign Agricultural Analysis Division, Foreign Agricultural Service, USDA. Taught at Texas A. and M. (Mathematics and Statistics)

RAMSAY, MAYNARD J., (1956). Ph.D., Cornell. Training Officer (General), Division Training Center, Plant Quarantine Division, Agricultural Research Service, USDA. Taught at Buffalo, Cornell, and Millard Fillmore. (Biological Sciences)

RANDALL, ROBERT H., JR., (1952). M.A., B.C.E., George Washington. Acting Director of Chart Construction, U. S. Hydrographic Office, Department of the Navy. (Technology)

RANKIN, WILLIAM J., (1959). Photographer. Soil Conservation Service, USDA. (Technology)

RAPP, WILLIAM F., (1958). B.A., Loyola (California). Management Analyst, Office of Management and Organization, Bureau of the Budget. (Public Administration)

RASMUSSEN, WAYNE D., (1950). Ph.D., George Washington. Agricultural Historian, Agricultural Marketing Service, USDA. (Public Administration and Correspondence)

RAUCHSCHWALBE, OTTO, (1950). M.S., Maryland. Economist, Commodity Stabilization Service, USDA. (Mathematics and Statistics)

REGAN, MARK M., (1955). M.A., Minnesota. Assistant Head, Land and Water Branch, Farm Economics Research Division, Agricultural Research Service, USDA. (Social Sciences)

REICH, DAVID, (1946). LL.B., Fordham. Attorney at Law. (Public Administration)

REID, MAX P., (1957). B.S., Utah State Agricultural College. Assistant Director, Office of Personnel, USDA. (Office Techniques and Public Administration)

REID, SEERLEY, (1948). Ph.D., Ohio State. Assistant Director, Educational Media Branch, Office of Education, Department of Health, Education, and Welfare. Taught at Northwestern, Ohio State, and Wisconsin. (Languages and Literature)

RENAUD, JULES S., (1957). B.S., Iowa State. Television Production Specialist, Office of Information, USDA. (Languages and Literature)

RICE, WILLIAM B., (1952). Deputy Director, Office Methods Division, Department of the Navy. (Public Administration)

RICKS, ARTEL, (1959). B.A., Western Reserve. Chief, Records Systems Branch, Office of Records Management, National Archives and Records Service, General Services Administration. (Office Techniques and Correspondence)

Riley, Paul H., (1959). B.S., Indiana. Director, Supply Management Policy, Office of the Assistant Secretary of Defense (Supply and Logistics), Department of Defense. (Public Administration)

Rixse, John H., Jr., (1958). B.S., George Washington. Assistant Chief, Electric Engineering Division, Rural Electrification Administration, USDA. Taught at Virginia. (Technology)

Robinson, James L., (1953). M.S., Cornell. Extension Economist, Agricultural Economics Programs, Federal Extension Service, USDA. *Retired.* (Committee on Correspondence Study and Extension Education)

Rodbell, Oscar, (1956). Chief, Color Photographic Branch, Armed Forces Institute of Pathology, Walter Reed Army Medical Center. (Technology)

Rodenhiser, H. A., (1960). Ph.D., Minnesota. Assistant Administrator, Farm Research, Agricultural Research Service, USDA. Taught at Minnesota. (Special Programs)

Rogers, William F., (1958). B.A., Arkansas College. Director of Personnel, Giant Foods, Inc. Taught at American and George Washington. (Public Administration)

Rojko, Anthony S., (1959). M.S., Connecticut. Analytical Statistician, Agricultural Economics Division, Agricultural Marketing Service, USDA. Taught at Connecticut. (Mathematics and Statistics)

Rosenzweig, Benjamin, (1951). B.S.Ch.E., College of the City of New York. Assistant Chief, Standardization Division, Armed Forces Supply Support Center, Department of Defense. (Technology)

Rowe, Harold B., (1947). B.S., Iowa State. Member, Senior Staff, The Brookings Institution. Taught at Massachusetts and Minnesota. (Social Sciences)

Rowe, Wallace P., (1955). M.D., Johns Hopkins. Senior Surgeon, U. S. Public Health Service, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

Rowe, William H., (1934). M.S., Kansas State. Federal Crop Insurance Corporation, USDA. Taught at Akron and Kansas State. (Public Administration)

Rubenstein, Albert M., (1955). M.S., Maryland. Electronics Engineer, Coordination of Surveillance Systems (R & D), Office of Naval Research, Department of the Navy. Taught at Maryland. (Technology)

Ruppert, M. Clare, (1947). M.A., George Washington. Coordinator, Adult Services, D. C. Public Library. (Languages and Literature)

Rusis, Armins, (1959). Ph.D., UNRRA University (Munich); M.C.L., George Washington. Legal Analyst, European Law Division, Law Library of Congress. Taught at European Universities. (Social Sciences)

Ryan, Walter F., (1953). Ph.D., Cornell. Deputy Chief of Statistical Standards, Bureau of the Budget. (Mathematics and Statistics)

Saharov, George M., (1941). B.A., California. Graduate of Classical Gymnasium, Tula, and Grand Duke Constantine Artillery School, Petrograd (Russia). Transportation Economist, Bureau of Transport Economics and Statistics, Interstate Commerce Commission. Taught at Southern California. (Languages and Literature)

Saroff, Harry A., (1954). Ph.D., Rensselaer. Senior Scientist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Georgetown. (NIH)

Sawchuk, Henry A., (1949). M.S., College of the City of New York. Chief, Traffic Services Section, Office of Engineering, Bureau of Public Roads, Department of Commerce. (Special Programs and Technology)

Saz, Arthur K., (1952). Ph.D., Duke. Bacteriologist, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Duke, Iowa State, and New York Medical College. (Biological Sciences)

Schaal, Wilbert, (1956). B.S., Ohio State. Agricultural Trade Promotion Specialist, Foreign Agricultural Service, USDA. (Languages and Literature)

Schaenzer, J. P., (1949). B.S., Wisconsin. Agricultural Engineer, Electric Operations and Loans Division, Rural Electrification Administration, USDA. (Technology)

Schaumann, Herbert, (1955). Ph.D., Cornell. Assistant Professor, University of Maryland. Taught at Cornell and Goucher. (Languages and Literature)

Schiffman, Zelda, (1954). B.A., Hunter; B.S.J., Columbia. Chief, Management Analysis Section, Office of the Director, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)

Schneider, Sidney, (1955). B.A., Brooklyn. Supervisory Budget Administration Officer, General Services Administration. Taught at George Washington. (Public Administration)

Schule, John J., Jr., (1954). B.A., St. John's University (N. Y.). Head, Applied Oceanography Branch, U. S. Hydrographic Office, Department of the Navy. Taught at New York. (Physical Sciences)

Schulman, Fred, (1957). Ph.D., Georgetown. Project Manager, Nuclear Electric Power Generating Systems, National Aeronautics and Space Administration. Taught at Pearl Harbor Training School. (Physical Sciences and Technology)

Schultheis, Henry, (1955). B.S., Cornell. Construction Management Engineer, Office of Chief of Engineers, Department of the Army. (Technology)

Schwartz, M. H., (1959). B.A., Illinois. Chief Analyst, Statistical Operations Planning Unit, Division of Research and Statistics, Federal Reserve Board. (Mathematics and Statistics)

Scott, John W., (1957). B.S., Texas A. and M. Assistant Chief (Accounting), Electric Operations and Loans Division, Rural Electrification Administration, USDA. (Correspondence)

Scoville, Orlin J., (1957). Ph.D., Harvard. Chief, Costs Income and Efficiency Research Branch, Farm Economics Research Division, Agricultural Research Service, USDA. (Social Sciences)

Selensky, Harold J., (1950). B.S., Georgetown. Chief, Accounting Division, Federal Aviation Agency. Taught at Maryland and Virginia. (Public Administration)

SELLERS, ASHLEY, (1941). S.J.D., Harvard. Attorney at Law. Taught at Emory and Georgia. (Public Administration)

SHAHN, EZRA, (1959). B.A., Bard. Physicist, Office of Mathematical Research, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Princeton. (NIH)

SHAKOW, DAVID, (1954). Ph.D., Harvard. Chief, Laboratory of Psychology, National Institute of Mental Health, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Chicago and Illinois. (NIH)

SHANES, ABRAHAM M., (1954). Ph.D., New York. Biophysicist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at College of the City of New York, Georgetown, and New York. (NIH)

SHAPIRO, NORMAN Z., (1960). Ph.D., Princeton. Chief, Computation and Data Processing Branch, Biometrics Branch, Division of Research Services, National Institutes of Health, Department of Health, Education, and Welfare. Taught at California and Princeton. (NIH)

SHERROD, JOHN, (1958). M.S., Pennsylvania State. Chief, Science and Technology Division, Library of Congress. Taught at Pennsylvania State. (Languages and Literature and Physical Sciences)

SHIMKUS, CHARLES R., (1958). B.S., Fairfield. Director of Training, Remington Rand UNIVAC, Washington, D. C. (Mathematics and Statistics)

SHOOK, ROBERT E., (1957). Photographer, Operations Research Office, Johns Hopkins. (Technology)

SIEGEL, JACOB S., (1949). M.A., Pennsylvania. Chief, Population Estimates and Projections Branch, Population Division, Bureau of the Census, Department of Commerce. (Mathematics and Statistics and Social Sciences)

SILVERSTEIN, ARTHUR M., (1959). Ph.D., Rensselaer. Chief, Immunochemistry Branch, Basic Sciences Division, Department of Pathology, Armed Forces Institute of Pathology. (Biological Sciences)

SILVERSTEIN, JULIUS, (1951). LL.B., Columbia. Assistant General Counsel, General Services Administration. Taught at National Law School. (Public Administration)

SIMMONS, WALT R., (1957). M.A., Kansas. Statistical Advisor, U. S. National Health Survey, Department of Health, Education, and Welfare. Taught at American and Kansas. (Special Programs and Mathematics and Statistics)

SIMONSON, ROY W., (1959). Ph.D., Wisconsin. Director, Soil Classification and Correlation, Soil Conservation Service, USDA. Taught at Iowa State. (Physical Sciences)

SIMMS, D. HARPER, (1952). B.A., B.J., Missouri. Director, Information Division, Soil Conservation Service, USDA. (Committee on Publications)

SIMPSON, CLARK L., (1956). M.C.S., Columbus. Controller, Federal National Mortgage Association. Taught at Cincinnati, Columbus, and Professional School of Accounting (Cleveland). (Public Administration)

SKOP, JACOB, (1951). Chief, User Requirements Division, Army Map Service, Department of the Army. (Technology)

SMITH, MARIE M., (1959). Chief, Procurement and Supply Management Branch, Division of General Services, Department of Health, Education, and Welfare. (Public Administration)

SNYDER, F. F., (1949). B.C.E., Ohio State. Hydraulic Engineer, Corps of Engineers, Department of the Army. (Technology)

SOURS, HAROLD H., (1956). B.J., Missouri. Chief, Features Section, Press Service, U. S. Information Agency. (Languages and Literature)

SOUTHARD, RUPERT B., JR., (1957). B.C.E., Syracuse. Mechanical Engineer. Branch of Research and Design, Topographic Division, U. S. Geological Survey, Department of the Interior. (Physical Sciences)

SPENCER, FRANK H., (1949). Executive Assistant Administrator, Agricultural Research Service, USDA. (Public Administration)

SPRINGER, DONALD P., (1957). B.S., Maryland. U. S. Naval Postgraduate School. Agricultural Meteorologist, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)

STADTMAN, EARL R., (1955). Ph.D., California. Chemist, National Heart Institute. National Institutes of Health, Department of Health, Education, and Welfare. Taught at California and Georgetown. (NIH)

STAMMEYER, EUGENE, (1958). M.A., Catholic. Staff Psychologist, Psychology Branch, St. Elizabeths Hospital, Department of Health, Education, and Welfare. Taught at Loras. (Social Sciences)

STARKEY, JAMES H., (1950). B.S., Virginia Polytechnic. Deputy Executive Assistant Administrator, Office of the Administrator, Agricultural Research Service, USDA. (Committee on Correspondence Study and Extension Education)

STARNS, HENRY C., (1957). B.A., George Washington. Chief, Personnel Division, Rural Electrification Administration, USDA. (Office Techniques and Correspondence)

STAUBER, B RALPH, (1931). M.A., Minnesota. Chief, Agricultural Price Statistics Branch, Agricultural Marketing Service, USDA. Taught at Minnesota. (Mathematics and Statistics)

STEARN, JOSEPH L., (1957). M.S., College of the City of New York. Mathematician, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at Virginia. (Mathematics and Statistics)

STEELE, J. GORDON, (1942). Ph.D., Ohio State. Chief, Soil Survey Reports, Soil Conservation Service, USDA. (Correspondence)

STEFFERUD, ALFRED D., (1960). B.A., St. Olaf. Publications Officer, Office of Information, USDA. Taught in South Dakota Public Schools. (Languages and Literature)

STEINBERG, DANIEL, (1954). Ph.D., Harvard; M.D., Wayne. Chief, Section on Metabolism, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Boston and Wayne. (NIH)

STEINBERG, JOSEPH, (1942). B.S., College of the City of New York. Chief, Statistical Methods Office, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)
STEININGER, MARGARET A., (1958). Ray-Vogue School of Interior Decoration. Owner, Peggy's Showroom, Washington, D. C. (Technology)
STEPHENS, EDMUND, (1952). M.S., Oregon State. Director, Budget and Finance Division, Agricultural Research Service, USDA. (Office Techniques)
STEPHENSON, JOHN L., (1959). M.D., Illinois. Biophysicist, National Heart Institute, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
STERN, HARRIET E., (1953). B.S. in Ed., Temple. Assistant to the Director, National Council for Accreditation of Teacher Education. Taught in Public Schools in New Jersey and Pennsylvania. (Office Techniques)
STETTEN, DEWITT, JR., (1956). Ph.D., M.D., Columbia. Associate Director in Charge of Research, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Columbia and Harvard. Lecturer at Johns Hopkins. (NIH)
STEVENS, GEORGE L., (1959). M.A., Maryland. Director, Reading Improvement Center, Graduate School, USDA. Taught at Maryland (Languages and Literature)
STEVENS, HENRY, (1946). Ph.D., George Washington. Chief Biochemist, Allergens Laboratory, Eastern Utilization Research and Development Division, Agricultural Research Service, USDA. (Physical Sciences)
STOCKARD, JAMES G., (1956). M.A., American. Chief, Training Section, Personnel Management Branch, Office of Administration, General Services Administration. (Public Administration)
STOCKER, FREDERICK D., (1955). Ph.D., Cornell. Head, Farm Taxation and Rural Government Section, Farm Economics Research Division, Agricultural Research Service, USDA. Taught at Cornell and Lehigh. (Social Sciences)
STONE, HAROLD A., (1946). M.S.P.A., Syracuse; M.E., Ohio State. Chief, Management Engineering Division, Office of the Comptroller of the Army, Department of the Army. (Public Administration)
STOVER, JAMES H., (1957). Head, Management Analysis Staff, Office of Administrative Assistant Secretary, Department of the Treasury. (Public Administration)
STRUHS, WILLIAM H., JR., (1958). M.A., Iowa. Supervisory Employee Development Officer, David Taylor Model Basin, Department of the Navy. Taught at Elon, George Washington, and South Dakota. (Languages and Literature)
SUPERVIA, G. MEDRANO DE, (1946). Licentciatura en Filosofia y Letras, Universidad de Valencia. Instructor, The Sidwell Friends School. Taught in the schools of Valencia (Spain), and the Dominican Republic. (Languages and Literature)
SUTER, GLENN W., (1957). M.S., Virginia Polytechnic Institute. Head, Systems and Programming Section, Statistical Standards Division, Agricultural Marketing Service, USDA. Taught at Bridgewater, Shenandoah, and Virginia Polytechnic Institute. (Mathematics and Statistics)
SWARM, RICHARD L., (1958). M.D., Washington. Pathologist, Laboratory of Pathology, National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Washington University. (NIH)
SWIFT, CLIFTON E., (1954). B.S., Maryland. Biochemist, Agricultural Research Service, USDA. (Agricultural Research Center Committee)
SYKES, JOSEPH F., (1950). Ph.D., Toronto. Head, Nutrition and Physiology Section, Dairy Cattle Research Branch, Animal Husbandry Research Division, Agricultural Research Service, USDA. Taught at Michigan State. (Agricultural Research Center Committee)

TAEUBER, CONRAD F., (1953). Ph.D., Minnesota. Assistant Director, Bureau of the Census, Department of Commerce. Taught at Mount Holyoke. (Mathematics and Statistics and Social Sciences)
TAGLIACOZZO, GIORGIO, (1958). Ph.D., Rome. Voice of America, U. S. Information Agency. Taught at New School for Social Research and Rome. (Social Sciences)
TARAKUS, EUGENIA, (1945). Russian Gymnasium and University of Liege. Associate Professor of Russian, Naval Language School. (Languages and Literature)
TATE, ELIZABETH L., (1960). B.L.S., Pratt Institute Library School. Head, Preliminary Cataloging Section, Descriptive Cataloging Division, Library of Congress. (Languages and Literature)
TAYLOR, CARL C., (1937). Ph.D., Missouri. Consultant on Community Development, The Ford Foundation. Taught at Brookings, Catholic, Missouri, North Carolina State, and Texas. (Social Sciences)
TAYLOR, HAL R., (1960). M.A., Michigan State. Information Specialist, Foreign Information Training, Office of Information, USDA. (Languages and Literature)
TETRO, ROBERT C., (1958). M.S., Massachusetts State. Assistant Administrator, Attaché Service, Foreign Agricultural Service, USDA. (Social Sciences)
TEWINKEL, G. C., (1946). M.C.E., Syracuse. General Engineer, Division of Photogrammetry, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at George Washington and Maryland. (Technology)
THACKREY, FRANKLIN, (1950). M.S., Kansas State. Director, Marketing Information Division, Agricultural Marketing Service, USDA. (Languages and Literature)
THIGPEN, JAMES E., (1951). B.S., Connecticut. Director, Oils and Peanut Division, Commodity Stabilization Service, USDA. (Social Sciences)
THOM, HERBERT C. S., (1959). M.S., George Washington. Chief Climatologist, Office of Climatology, U. S. Weather Bureau, Department of Commerce. Taught at Cornell, Iowa State, and Maryland. (Physical Sciences)
THOMAS, ALMON D., (1950). B.S.E.E., Colorado. Hydraulic Engineer, Bureau of Power, Federal Power Commission. (Technology)
THOMAS, ARMSTRONG, (1958). M.A., Swarthmore. Astronomer, U. S. Naval Observatory, Department of the Navy. Taught at Virginia. (Physical Sciences)

THOMAS, PAUL D., (1948). M.A., Oklahoma. Mathematician, Geodesy Division, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at Florida, George Washington, Oklahoma, and Southeastern State (Durant, Oklahoma). (Technology)
THURSTON, JOHN H., (1943). Ph.D., Harvard. Staff Assistant, Office of the Deputy Administrator, Production Adjustment, Commodity Stabilization Service, USDA. Taught at Northwestern. (Public Administration)
TIERNEY, LOUIS M., (1960). B.S.E.E., Maryland. Chief, Management Engineering Branch, Office of Chief of Engineers, Department of the Army. (Technology)
TILLER, CARL W., (1946). M.A., Minnesota. Chief of Budget Methods, Office of Budget Review, Bureau of the Budget. (Public Administration)
TRELOGAN, HARRY C., (1948). Ph.D., Minnesota. Assistant Administrator, Agricultural Marketing Service, USDA. Taught at Minnesota. (Special Programs and Social Sciences)
TUTHILL, CHARLES S., (1955). B.S., Cornell. Training Officer (Plant Pathology), Division Training Center, Plant Quarantine Division, Agricultural Research Service, USDA. (Biological Sciences)

ULLMAN, MORRIS B., (1955). M.A., American. Statistician, Bureau of the Budget. (Mathematics and Statistics)

VALLIERES, VINCENT B., (1957). Office of Vice President for Operations, Southern Railway System. Instructor, Department of the Army. (Office Techniques)
VAN DERSAL, WILLIAM R., (1957). Ph.D., Pittsburgh. Assistant Administrator for Management, Soil Conservation Service, USDA. Taught at Pittsburgh. (Office Techniques and Correspondence)
VAUGHAN, JOHN W., (1957). C.P.A. Deputy Director, Fiscal Division, Commodity Stabilization Service, and Chief Accountant, Commodity Credit Corporation, USDA. (Committee on the Internal Audit)
VICAN, GEORGE, (1958). Ph.D., Charles; Paris and Sorbonne. Taught at George Washington and Universidad Nacional Autónoma de Mexico. (Languages and Literature)
VOGELY, WILLIAM A., (1954). Ph.D., Princeton. Assistant Chief Economist, U. S. Bureau of Mines, Department of the Interior. Taught at Kenyon. (Social Sciences)
VON LUTTICHAU, CHARLES V. P., (1957). M.A., American. Historian, Office of the Chief of Military History, Department of the Army. Taught at Foreign Service Institute. (Languages and Literature)

WADLEY, F. M., (1944). Ph.D., Minnesota. Analytical Statistician in Biology, U. S. Army Chemical Corps, Department of the Army. Taught at Minnesota. (Correspondence)
WAGNER, GLENN D., (1955). B.A., Syracuse. Management Analyst, Office of Management Analysis, National Aeronautics and Space Administration. (Office Techniques)
WAHLGREN, JOHN, (1959). M.A., California. Supervisory Training Officer, Department of Defense. Taught at American and George Washington. (Languages and Literature)
WALKER, JOHN W., (1958). B.A., George Washington. Head, Allotments and Apportionments Section, Office of Budget and Finance, USDA. (Office Techniques)
WALKER, NORA M., (1956). Staff Associate, Center for Applied Linguistics. Taught at Foreign Service Institute. (Office Techniques)
WALLING, HERSCHEL C., (1946). M.B.A., Texas. C.P.A. Supervisory Accountant, General Accounting Office. Taught at Texas. (Public Administration)
WALSH, ROBERT M., (1947). B.S., Boston. Director, Market Development Research Division, Agricultural Marketing Service, USDA. (Social Sciences)
WARNER, KENNETH F., (1955). M.S., Minnesota. Professor of Extension Studies and Training, University of Maryland. Taught at Colorado and Minnesota. (Social Sciences)
WATTS, JOHN A., (1955). B.S., Virginia. Director of Civilian Personnel, Department of the Air Force. (Public Administration)
WAUGH, FREDERICK V., (1939). Ph.D., Columbia. Director, Agricultural Economics Division, Agricultural Marketing Service, USDA. Taught at Brookings and Cornell. (Social Sciences)
WEBSTER, R. LYLE, (1946). Ph.D., American. Director of Information, USDA. Taught at American. (Languages and Literature)
WEIGAND, GEORGE R. J., (1959). Ph.D., Maryland. Director, Office of Intermediate Registration, University of Maryland. Taught at Maryland. (Languages and Literature)
WEISS, MARTIN G., (1951). Ph.D., Iowa State, Associate Director, Crops Research Division, Agricultural Research Service, USDA. Taught at Iowa State. (Agricultural Research Center Committee and Biological Sciences)
WEITZELL, EVERETT C., (1952). Ph.D., Wisconsin. Deputy Assistant Administrator, Rural Electrification Administration, USDA. Taught at Maryland and West Virginia. (Social Sciences)
WELLS, JOHN L., (1952). Certificate, Business Administration. Assistant Director, Office of Budget and Finance, USDA. (Special Programs and Public Administration)
WEST, QUENTIN M., (1957). Ph.D., Cornell. Chief, Far East Branch, Foreign Agricultural Service, USDA. Taught at Cornell. (Mathematics and Statistics)
WHITE, BENNETT S., JR., (1938). Ph.D., Harvard. Assistant Director in Charge of Economics and Marketing. State Experiment Stations Division, Agricultural Research Service, USDA. Taught at George Washington, Kentucky, and Virginia. (Social Sciences)
WHITE, ELMO J., (1955). Chief, Art and Graphics Division, Office of Information, USDA. (Committee on Information and Languages and Literature)
WILBUR, GLEN, (1954). B.A., Washington. Assistant Chief of Personnel, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
WILMETH, JO BRICE, (1959). B.A., Texas Christian. Analytical Statistician, Veterans Administration. (Mathematics and Statistics)
WILLIAMS, RALPH C., (1960). M.S., Maryland. Vice President, Federal Lithograph Company, Washington, D. C. (Technology)

Wilson, Edward F., (1960). M.A., American. Assistant Chief, Electric Operations and Loans Division, Rural Electrification Administration, USDA. (Public Administration)
Wilson, M. L., (1938). D.S.C., Montana. Consultant, Extension Education and Community Development, Overseas Programs, USDA. *Retired.* (Correspondence)
Winegrad, Saul, (1960). M.D., Pennsylvania. National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at George Washington. (NIH)
Winfrey, Robley, (1953). M.S.C.E., Iowa State. Chief, Highway Needs and Economy Division, Office of Research, Bureau of Public Roads, Department of Commerce. Taught at Iowa State. (Technology)
Winger, Carsten M., (1960). B.A., Luther. Oceanographer, Division of Oceanography, U. S. Hydrographic Office, Department of the Navy. Taught at Minnesota and Pittsburgh. (Physical Sciences)
Winslow, Joseph E., (1960). Assistant to the Special Assistant to the President for Personnel Management, The White House. (Special Programs)
Winston, Jay S., (1949). M.S., New York. Supervisory Meteorologist, U. S. Weather Bureau, Department of Commerce. Taught at New York. (Physical Sciences and Correspondence)
Wolfrey, William T., (1960). B.S., American. Budget Methods Specialist, Bureau of the Budget. (Special Programs and Office Techniques)
Wood, N. O., Jr., (1959). Director, Division of Property Management, Office of the Secretary, Department of the Interior. (Public Administration)
Woods, Mark W., (1958). Ph.D., Maryland. Biologist (Cytologer), Section of Cytochemistry, Laboratory of Biochemistry, National Cancer Institute, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Maryland. (Special Programs and NIH)
Worf, Douglas L., (1960). Ph.D., Georgetown. Assistant Director for Technical Papers, Office of the UN Conference, National Aeronautics and Space Administration. (Physical Sciences)
Wright, Barbara E., (1957). Ph.D., Stanford. Biochemist, National Heart Institute. National Institutes of Health, Department of Health, Education, and Welfare. Taught at Stanford. (NIH)
Wylie, Charles E., (1958). Attended Michigan State. Assistant Director, Office of Administrative Management, USDA. (Public Administration)

Yates, Galen, (1954). Chief, Administrative Management Division, Office of Information, USDA. (Committee on Correspondence Study and Extension Education)
Young, George A., (1954). B.S., Michigan State. Training Officer, Agricultural Marketing Service, USDA. (Committee on Correspondence Study and Extension Education and Correspondence)

Zaratzian, Virginia L., (1960). Ph.D., Wayne State. Pharmacologist, Division of Pharmacology, Food and Drug Administration, Department of Health, Education, and Welfare. (Physical Sciences)

Index

Publications of the Graduate School

International Relations

The International Age in Agriculture. Five lectures and a summary of discussion in seminars that followed the last four lectures. This series aroused interest both in the United States and in foreign countries. It comprises: "Food for Peace," Don Paarlberg, Special Assistant to the President; "Technical Assistance Programs in Agriculture—International and Regional," Norman C. Wright, Deputy Director-General, Food and Agriculture Organization; "World Agricultural Market—Opportunities and Limitations," Max Myers, Administrator, Foreign Agricultural Service, U. S. Department of Agriculture; "Agricultural and Assistance Programs of Other Countries—Including the Sino-Soviet Bloc Countries," Thomas C. Mann, Assistant Secretary, U. S. Department of State; "Helping Other Countries Improve Their Agriculture," D. A. Fitzgerald, Deputy Director for Operations, International Cooperation Administration, U. S. Department of State. Paper bound (1960), 96 pages. $1.75

Public Administration

As I See It: Observations of a Civil Servant by Warner W. Stockberger. Fifty short essays on public administration, especially personnel administration, written by the "dean of personnel administrators" in the Federal service. Paper bound (1941), 50 pages. 50¢

Lectures on Administrative Regulation. By Lloyd K. Garrison, Thomas Blaisdell, Paul H. Appleby, Fowler Harper, Clarence Kitchen, and Jacob Rosenthal. Paper bound (1945), 80 pages. 50¢

William A. Jump-I. Thomas McKillop Memorial Lectures in Public Administration

Series one. Legislative-Executive Relationships in the Government of the United States. Presented by Chief Judge Marvin Jones, Dr. Ernest S. Griffith, Congressman Clifford R. Hope, Earl D. Johnson, Frederick J. Lawton, Congressman Melvin R. Laird, Senator George D. Aiken, Secretary of Agriculture Ezra Taft Benson. Paper bound (1954), 65 pages. $1.50

Series two. Democracy in Federal Administration. Presented by John M. Gaus, Professor of Government, Harvard University; Herbert Emmerich, Director, Public Administration Clearing House; Arthur MacMahon, Eaton Professor of Government, Columbia University; James R. Wiggins, Vice-President and Managing Editor, The Washington Post; Wallace S. Sayre, Professor of Government, Columbia University. Paper bound (1956), 80 pages. $1.25

Series three. The Influences of Social, Scientific, and Economic Trends on Government Administration. "A Philosophy for the American Public Executive," Harlan Cleveland, Dean, Maxwell Graduate School of Citizenship and Public Affairs, Syracuse University; "Influence of Social Trends on Administration," The Honorable Byron L. Johnson, Congressman, Colorado; "Influence of Economic Trends on Administration," Karl Brandt, Member of the Council of Economic Advisers; "Influence of Scientific and Technological Trends on Administration," Charles J. Kidd, Chief, Office of Program Plan-

ning, National Institutes of Health; "Promoting Administrative Vitality," Marshall Dimock, Professor of Government, New York University. Paper bound (1960). (In press).

Science

Progress in the Field of Antibiotics. Edited by H. T. Herrick and George W. Irving, Jr. Available from Chemical Publishing Co., Brooklyn, N. Y.

Statistics

Introduction to Experimental Statistics by Walter A. Hendricks, Agricultural Marketing Service, U. S. Department of Agriculture. Mimeographed. Paper bound (1953), 251 pages. $3.00

Lectures and Conferences on Mathematical Statistics and Probability by Jerzy Neyman, Professor and Director of Statistical Laboratory, University of California, Berkeley. Second edition, revised and enlarged. Cloth bound (1952), 274 pages. $5.00

On the Statistical Theory of Errors by W. Edwards Deming and Raymond T. Birge. Paper bound (1938), 50 pages. 40¢

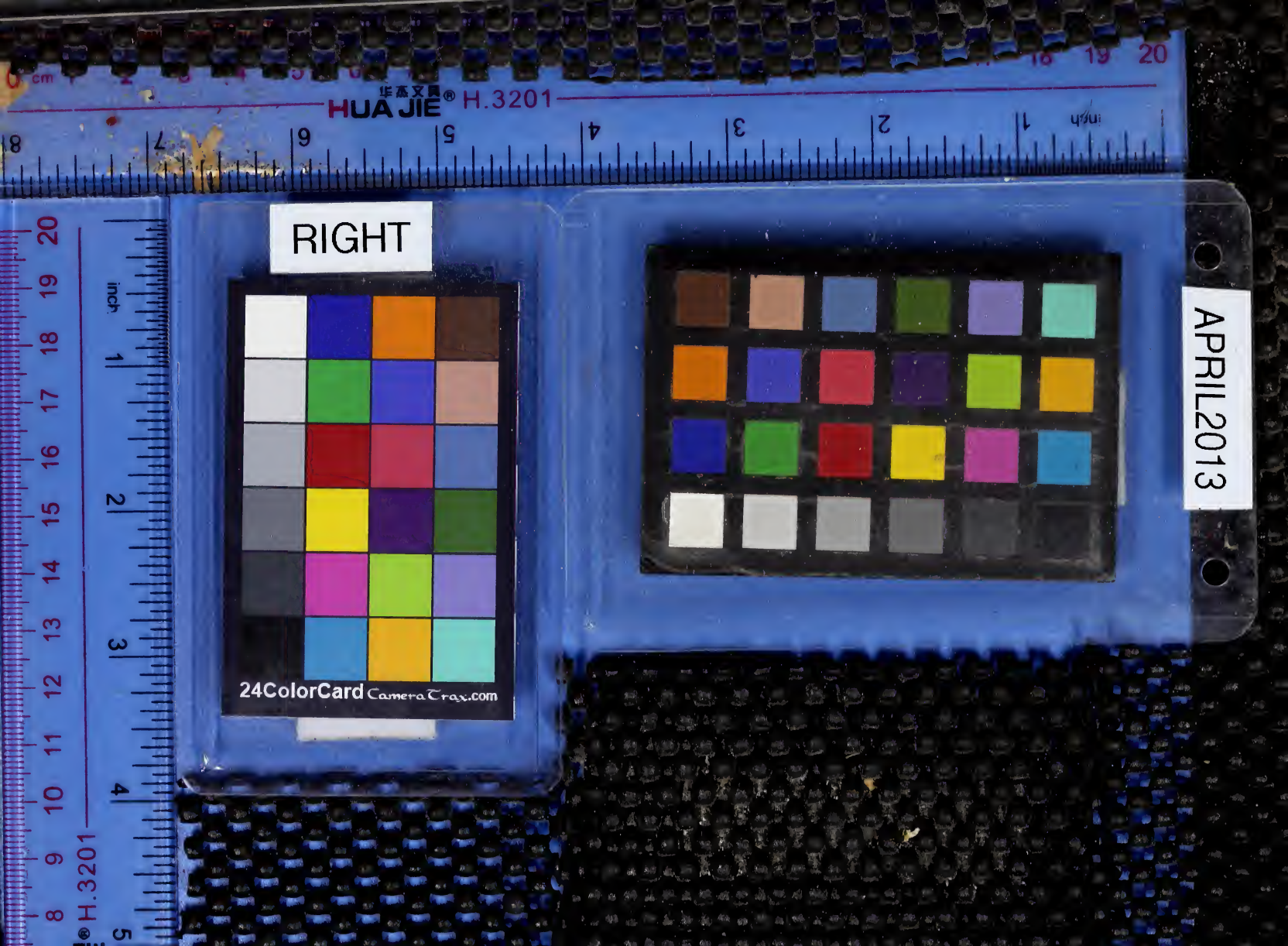
Statistical Method from the Viewpoint of Quality Control by Walter A. Shewhart, edited by W. Edwards Deming. Cloth bound (1939), 155 pages. $1.50

Quantity Discount: Less than 10 copies, no discount; 10–20 copies, 10 per cent; over 20 copies, 20 per cent

Make checks and money orders payable in advance to

GRADUATE SCHOOL
U. S. DEPARTMENT OF AGRICULTURE
Washington 25, D. C.

School Address:	Room 1031, South Agriculture Building, 14th Street and Independence Avenue, S.W., Washington 25, D. C.
Office Hours:	9:00 A.M. to 6:15 P.M., Monday through Friday.
Telephone:	Dudley 8-6337.
Classes:	Most classes meet in the evening. For exact time of classes, see semester supplement, *Schedule of Classes.*
Classrooms:	Classroom assignments are given to the student at the time of registration.
Bookstore:	Textbooks can be purchased at the Graduate School bookstore, Room 1023, South Agriculture Building. See *Schedule of Classes* for hours.


HUA JIE H.3201
RIGHT
24ColorCard CameraTrax.com
APRIL2013